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Gases Evolved During Carburization

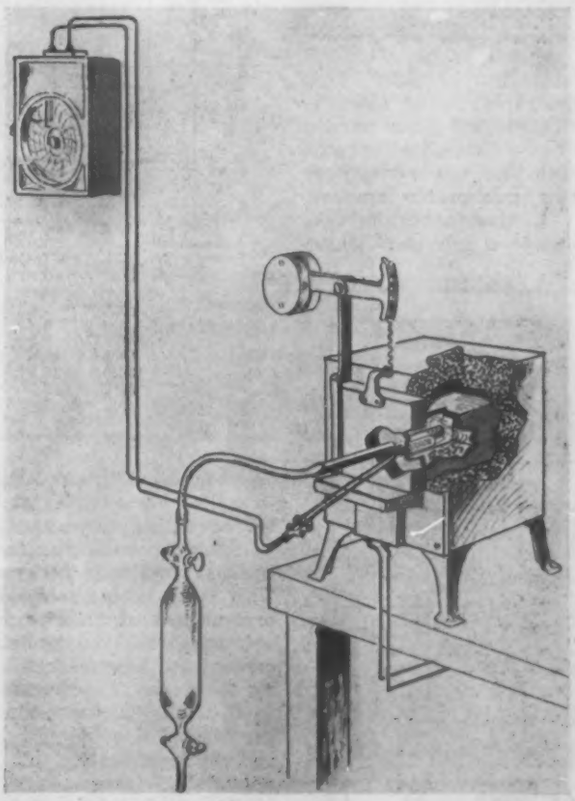
Chemical Study of the Behavior of Five Solid Commercial Compounds—Theory of the Process

BY VICTOR E. HILLMAN*

THE total cementation process is a forerunner of modern pack hardening. The early procedure consisted in carburizing the steel throughout. Modern case hardening or partial cementation, however, implies that a high carbon layer of metal is superimposed upon a core of lesser carbon content. The operation is arrested after a suitable case is formed. The purpose of the process is to manufacture steel objects with an outer zone or skin capable of heing hardened, and still retaining a soft and tough center or core.

The process of cementation had its inception during the middle ages. The manufacturers of daggers, arms and needles were familiar with the art. The technique of their procedure, however, was slow to enter industrial channels. Each artificer boasted the superiority of his own practice. The only secrets transmitted were those communicated from father to son.

The carburization of steel was given further impetus during the early part of the eighteenth century, when the French scientist Réaumer conducted a series of elaborate cementation experiments. He detected the formation of an outer zone, capable of being hardened. Moreover, he observed that the transformation proceeded gradually from the surface toward the interior of the metallic mass, and that the steel increased in weight as the result of carburization. Réaumur's memoirs were communicated to the Academy of Sciences of Paris during the years 1720 to 1722. The results of his investigations gave rise to clear and precise rules for the effective technical application of the process of cementation. Subsequently, the art became possible in all establishments.



Arrangement of the Apparatus Used in the Investigation of the Gases Evolved During Carburization

The cements recommended by Réaumur were capricious mixtures of organic substances such as hoofs, hides, dung, etc. These complex substances were quickly abandoned and powdered charcoal was adopted as a carburizing medium. It is a well recognized fact that pure carbon will carburize steel, providing it is kept in contact with it for a sufficiently long time and at a sufficiently high temperature. From the standpoint of industrial heat treating, however, pure carbon will not act simply by contact without the intervention of any gas or vapor.

Carburization is attained by heating the steel, protected from contact with air, to 1600 deg. Fahr. or thereabouts. The surface of the object is kept intimately associated with a carburizing compound which slowly decomposes under the application of heat. The carbonaceous gases which are evolved gradually penetrate or diffuse into the mass of the steel. The gases enter the pores of the metal dilated by heat. Steel heated to a high temperature is easily permeable to various gases. Modern carburizing compounds contain carbon as a base either in the form of charred leather, charcoal, coal or coke, to which has been added salts. Briefly, they are built up from carbonaceous dust, binder and energizer.

Calcium carbonate is commonly used as an energizer. It yields all of its CO_2 between 1000 and 1600 deg. Fahr. Magnesium carbonate has some merit. Its advantage lies in the readiness with which it is completely dissociated, namely, at 1375 deg. Fahr. Sodium carbonate, on the other hand, does not dissociate to any appreciable extent at cementation temperatures. Scheerer noted that sodium carbonate loses 0.5 per cent of its weight due to the evolution of CO_2 when the salt is heated to 1832 deg. Fahr. However, when

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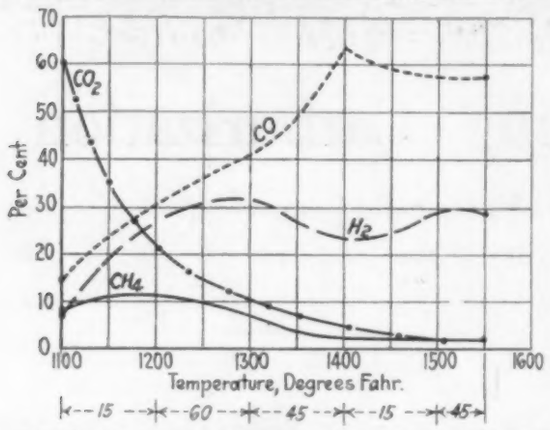
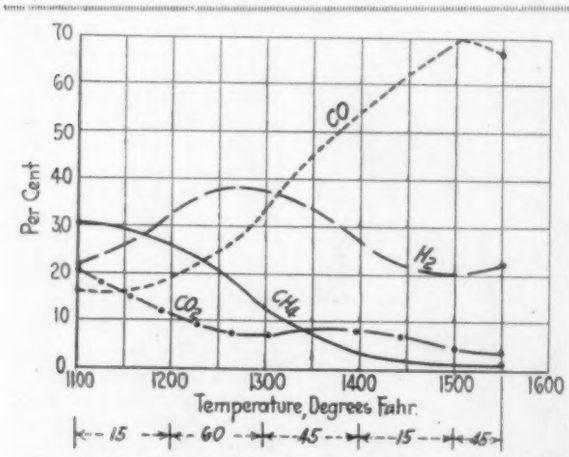
sodium carbonate is used in combination with calcium, barium or magnesium carbonates, a complex mixture is formed which gives off its CO_2 at lower temperatures. Moreover hydrogen, whose presence will be hereinafter noted, accelerates the decomposition of sodium carbonate and thereby assists in the evolution of CO_2.

By the same token, barium carbonate will not evolve CO_2 at the temperature of ordinary pack hardening. Mellor records the report of an observation which states that the CO_2 evolved from barium carbonate at 1826 deg. Fahr. has a partial pressure of zero millimeters. This signifies that the quantity of gas given off is less than a measurable amount. Therefore, the evolution of CO_2 when a barium carbonate energizer is used is due to a substance whose reputed formula is $Na_2Ba(CO_3)_2$. In other words, the presence of sodium carbonate is necessary to effect dissociation.



Sample No. 1.—The following gases were evolved at the several temperatures adopted:

	1100°F.	1200°F.	1300°F.	1400°F.	1500°F.	1550°F.
CO_2	60.6	22.0	12.0	5.0	2.4	2.0
Illuminants	0.0	0.0	0.4	0.3	0.2	0.2
O_2	1.0	1.0	0.6	0.7	0.8	1.0
CO	14.6	31.0	41.0	63.6	57.6	57.6
CH_4	8.3	11.6	7.4	2.2	2.1	1.6
H_2	7.1	27.7	32.1	23.0	29.8	28.5
N_2	8.4	6.7	6.5	5.2	7.1	6.6

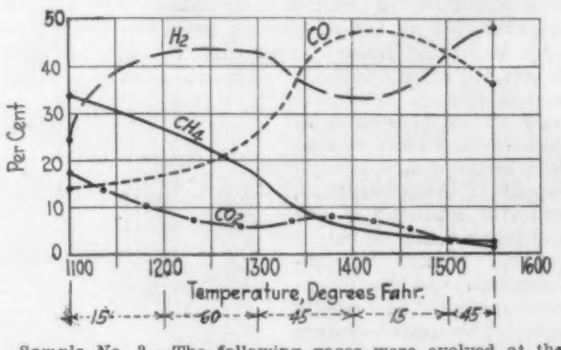


Sample No. 2.—The following gases were evolved at the several temperatures adopted:

	1100°F.	1200°F.	1300°F.	1400°F.	1500°F.	1550°F.
CO_2	21.0	11.2	6.4	8.2	4.4	3.2
Illuminants	1.0	0.3	0.6	0.2	0.1	0.0
O_2	0.6	0.9	0.6	0.2	0.3	0.3
CO	16.6	18.3	34.0	54.7	68.4	66.6
CH_4	30.9	25.9	12.8	3.7	0.4	0.9
H_2	21.9	33.2	37.8	27.1	20.1	22.9
N_2	8.0	9.7	7.8	5.9	6.3	6.1

Carburizing substances or cements may be either solid, liquid or gaseous. The object of the author's investigation is to set forth the gaseous behavior of a number of the solid commercial compounds that are found on the market today. Five well known compounds were selected for experimentation. Uncharred bone was adopted as a standard due to its superior carburizing properties. The essential nature of the manufactured compounds was similar. They contained calcium, barium, magnesium or sodium salts in the form of carbonates. It might be mentioned that the calcium and sodium salts predominated. The base was of a carbonaceous nature. The constitution of the substances, which experience has shown to be most efficient in producing cementation, are carbon and the carbonates of the alkali or alkaline earth metals.

A weighed quantity (¾ lb.) of carburizing compound was introduced into an air tight compartment which was equipped with an exit tube and thermocouple. Sketch No. 1 illustrates the arrangement of the apparatus. The gas sampling tube is shown in the foreground. The interior of the carburizing box—12 x 5 x 3 in.—was gradually heated from room temperature to 1550 deg. Fahr. The total time consumed in each instance was 5 hr. The rate of heating was immaterial. Concordant results were obtained for both slow and accelerated heating velocities. The maximum working temperature used in the investigation was 1550 deg. Fahr. The flow of gas became negligible beyond that point save for the appearance of approximately 5 cc. of gas per min. The total volume of gas given off ranged from 65 to 85 liters. No appreciable quantities of gas were evolved after one hour at 1700 deg. Fahr. An attempt was made to collect gas samples at 5, 10, 15, 20 and 25 hr. intervals with little or no success.



Sample No. 3.—The following gases were evolved at the several temperatures adopted:

	1100°F.	1200°F.	1300°F.	1400°F.	1500°F.	1550°F.
CO_2	17.1	9.6	6.0	7.4	3.1	1.6
Illuminants	0.9	0.2	0.0	0.2	0.2	0.2
O_2	1.2	1.2	0.0	0.8	1.0	0.5
CO	14.2	16.8	26.1	47.2	43.3	36.6
CH_4	34.0	25.9	17.2	5.2	2.4	2.3
H_2	24.3	42.5	43.1	33.7	43.0	48.3
N_2	8.3	3.8	7.6	5.5	7.0	10.5

All compounds manifested traces of ammonia and hydrogen sulphide between 500 and 1300 deg. Fahr. This result is probably due to the decomposition of organic matter. Moreover, the gases issuing from the exit tube could be ignited, when the interior of the carburizing box reached 1100 deg. Fahr. The maximum volume of carburizing gas was evolved between 1300 and 1450 deg. Fahr. Beyond 1450 deg. Fahr., the rate of flow steadily decreased until at 1550 deg. Fahr. the quantity of gases evolved was almost negligible.

The results obtained from samples Nos. 1, 2, 3, 4, 5, 6, and No. 1 reheated are hereinafter set forth. The action of the important gases, i. e. carbon dioxide, carbon monoxide, hydrogen and methane, are presented in graphic form. Gas samples were taken at 15, 45, and 60-min. intervals as shown beneath the abscissae.

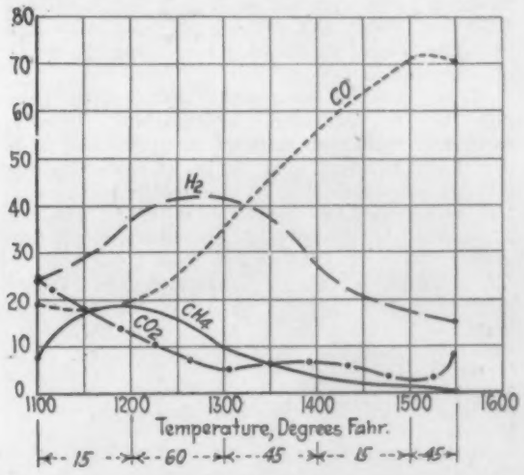
It will be observed that the percentage of carbon dioxide predominates in the early stages of heating. The CO_2 is produced by the dissociation of the carbonates. As the temperature increases, the percentage of CO_2 rapidly declines. With the decline of CO_2 there is a corresponding increase in CO. The carburizing action of a case-hardening compound is due to the evolution of carbon dioxide which is subse-

quently reduced to carbon monoxide. The maximum percentage of CO is reached between 1400 and 1500 deg. Fahr. Cemented zones occasioned by this gas are characterized by the fact that in them the concentration of the carbon does not exceed 0.90 per cent. The action of carbon monoxide is "gradual," giving cemented zones of the hypo-eutectic type. The gas yields one half of its carbon to the steel, again passing over into carbon dioxide which is again immediately reduced to carbon monoxide by the action of the hot carbon base. The cycle of reactions is reproduced indefinitely. The carbon monoxide acts as a carrier or vehicle.

$$CO_2 + C \underset{}{\overset{CO_2}{\rightleftharpoons}} 2\,CO$$

$$2\,CO + 3\,Fe = Fe_3C + CO_2$$

Methane is present in small amounts. This gas exerts carburizing action. Giolitti states that "the addition of small quantities of volatile hydrocarbons to carbon monoxide merely raises the concentration of the carbon in the external layers of the cemented zones above the value which would result from the use of pure carbon monoxide under identical experimental conditions." The cemented zones produced by CH_4 are characterized by a highly carburized external layer in



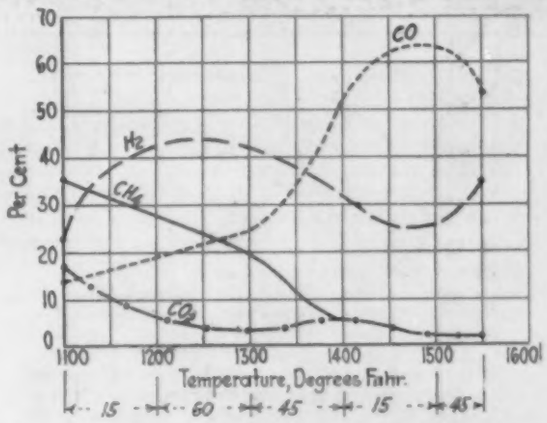
Sample No. 4.—The following gases were evolved at the several temperatures adopted:

	1100°F.	1200°F.	1300°F.	1400°F.	1500°F.	1550°F.
CO_2	24.0	12.6	4.6	6.6	2.8	3.0
Illuminants	0.2	0.0	0.2	0.0	0.3	0.0
O_2	1.6	1.4	0.3	0.0	0.5	0.0
CO	19.2	19.4	35.4	56.0	71.6	70.4
CH_4	7.3	19.4	9.3	3.4	1.3	0.0
H_2	23.2	36.8	41.5	26.3	17.4	15.1
N_2	24.5	10.4	7.7	7.7	6.1	6.5

which the concentration of the carbon surpasses 0.90 per cent. Steel carburized with this cement would be characterized by a layer or zone of hyper-eutectoid steel consisting of free cementite and pearlite. An undue amount of this gas would cause the case to chip or flake from the remainder of the steel. The hydrocarbons function by virtue of decomposition. They cause carbon to be deposited on the metal, which in turn produces carburization by direct contact. The larger the proportion of hydrocarbons contained in the gaseous mixture, the greater the concentration of carbon in the outer zone. The hydrocarbons are known as "sudden" cements. They will cement steel at 1300 deg. Fahr.

Illuminants are classified as unsaturated hydrocarbons. The series includes ethylene and acetylene. The manner in which they act is controversial. The reactions which take place are extremely complex. Some investigators contend that the gases diffuse into the steel and there yield carbon. Others maintain that the gases owe their carburizing action essentially to the deposition of solid carbon which is assimilated into the metal by direct contact. Suffice it to say that small quantities of these gases have a tendency to raise the concentration of the carbon in the external layers of the cemented zones.

The presence of hydrogen may or may not be of importance. It is consistently present in all of the compounds investigated. It is a well known fact that the brittleness of cemented steels is not due entirely to the heating which accompanies cementation. A difference exists between carburized bars and those simply heated. It is likely that the presence of hydrogen con-

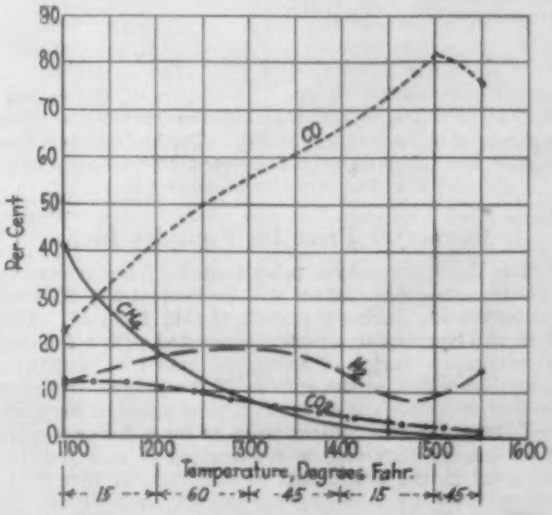


Sample No. 5.—The following gases were evolved at the several temperatures adopted:

	1100°F.	1200°F.	1300°F.	1400°F.	1500°F.	1550°F.
CO_2	17.2	6.4	3.5	5.6	2.2	2.0
Illuminants	0.3	0.8	0.5	0.6	0.4	0.2
O_2	1.9	0.4	0.4	0.3	0.4	0.8
CO	14.0	19.2	24.6	51.4	63.1	54.0
CH_4	35.3	28.3	19.9	5.0	2.5	1.7
H_2	22.6	42.8	42.2	31.6	25.5	35.3
N_2	8.7	2.1	8.9	5.5	5.9	8.0

tributes to the brittleness of carburized work. Precise investigations have not been undertaken, however.

The action of nitrogen in the process of cementation has been studied by Braune. His interesting researches, a summary of which was published in *Stahl*



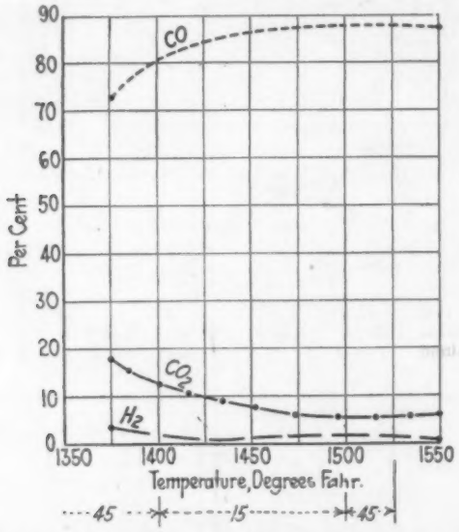
Sample No. 6—*Bone.*—The following gases were evolved at the several temperatures adopted:

	1100°F.	1200°F.	1300°F.	1400°F.	1500°F.	1550°F.
CO_2	11.8	11.6	7.2	4.6	2.2	1.6
Illuminants	0.7	1.0	0.2	0.6	0.4	0.6
O_2	1.6	0.4	0.2	0.0	0.4	0.7
CO	22.3	41.5	55.8	66.8	81.6	75.1
CH_4	41.6	18.7	7.7	2.4	0.9	0.0
H_2	12.2	18.1	19.3	14.3	8.9	14.9
N_2	9.8	8.4	9.6	11.3	5.6	7.1

und Eisen, 1907, show that steel which has been subjected to cementation undergoes an absorption of nitrogen. Minute quantities of the gas diffuse into the steel. Le Chatelier suggested that the phenomenon may account for the brittleness of the "heart" or "core" of cemented steels. Moreover, nitrogen has a tendency

to reduce the cementing action of CO by acting as a diluent.

Sample No. 1 was exposed to the air for two days, whereupon it increased in weight. The compound was then reheated to 1550 deg. Fahr. and its chemical behavior noted. No appreciable quantity of gas was evolved until 1375 deg. Fahr. The total volume given off was one half that evolved by a fresh compound. The hydrocarbons were practically negligible. The predominating gases were carbon monoxide and carbon



Sample No. 1—Reheated.—The following gases were evolved at the several temperatures adopted:

	1375°F.	1400°F.	1450°F.	1500°F.	1550°F.
CO_2	18.2	12.6	8.2	6.0	6.2
Illuminants	0.0	0.2	0.0	0.2	0.1
O_2	1.2	0.8	0.8	0.8	0.9
CO	73.0	81.2	86.0	88.0	87.8
CH_4	0.0	0.0	0.4	0.0	0.0
H_2	3.1	1.7	1.1	1.3	0.4
N_2	4.5	3.5	3.5	3.7	4.6

dioxide. As in other instances, the gases ceased to be evolved at 1550 deg. Fahr.

Cements possess the property of being "regenerated" when left exposed to the air. Regeneration is based upon the absorption of CO_2. The oxides formed during cementation by the dissociation of the carbonates absorb CO_2 again forming the carbonate. The presence of moisture is necessary. The hydroxide is first formed and subsequently converted to the carbonate.

Conclusions

1. Slow or accelerated heating does not alter the analysis of the gas evolved at the several temperatures adopted.

2. For a given temperature, there is a definite maximum concentration of carbon monoxide.

3. At higher temperatures the activity of the cements investigated is due essentially to CO.

4. The evolution of carburizing gases practically ceases at 1550 deg. Fahr. This value is nearly consistent with the complete dissociation temperature of calcium carbonate.

5. The maximum percentage of carbon monoxide is found within the range 1400 to 1500 deg. Fahr. The upper value is nearly consistent with the best temperature for cementation. The mechanical properties of the steel, i.e., brittleness of "core" or "heart," are less affected at 1550 deg. Fahr. than at any other carburizing temperature.

6. Prolonging the time at 1550 deg. Fahr. does not give rise to appreciable volumes of gas. Herein lies the advantage of luting carburizing boxes. Boxes sealed with fire clay prevent the escape of the active gases which are in the carburizing box at 1550 deg. Fahr. If the carburizing gases were not entrapped, heating above 1550 deg. Fahr. and prolonging the time would be futile toward appreciably increasing the depth of cementation.

7. All of the compounds investigated gave rise to a saturated hydrocarbon, namely, methane. Sufficient methane is evolved at 1100 deg. Fahr. to effect some degree of carburization. Charpy maintains that he obtained true cementation as low as 1050 deg. Fahr. with this gas.

8. The illuminants or unsaturated hydrocarbons were at all times less than 1 per cent.

The literature search embraced the following references:

Stahl und Eisen
Revue de Metallurgie
Giolliti
Sauveur
Harry Brearley—"The Case Hardening of Steel"
Bullens
H. B. Knowlton—Forging and Heat Treating—Dec., 1921
C. E. Carpenter—Forging and Heat Treating—Dec., 1921
H. B. Knowlton—Forging and Heat Treating—March, 1922
J. W. Mellor—"Inorganic and Theoretical Chemistry"

The author wishes to acknowledge the work which was done by T. L. Counihan and E. D. Clark of the Crompton & Knowles research staff.

Obermayer Prize for Foundry Ideas

The third Obermayer prize contest of the American Foundrymen's Association will be held at the Milwaukee convention during the week of Oct. 13 to 17. This prize will be given to a person connected with a foundry submitting a device, drawing or model of some jig or method which, in the opinion of the judges, embodies the best ideas for the economical production of castings.

Entries for this contest must be for a jig or a piece of equipment that can be constructed in any foundry and used in the production of castings, in core making, molding or handling operations and should be accompanied by a written statement setting forth the merits of the particular device and methods of application.

The judges' decision will be announced at the general business meeting on Wednesday, Oct. 15, at which time the John A. Penton and J. H. Whiting gold medals of the association will be presented to Enrique Touceda and John Howe Hall. The winner of the Obermayer prize contest will be given a valuable prize and a certificate from the association.

Foundry executives are invited to bring this contest to the attention of any persons in their employ who are eligible and urge them to compete. Any one contemplating entering this contest should write immediately to the secretary of the association, 140 South Dearborn Street, Chicago.

Pittsburgh Steel Treaters

The Pittsburgh chapter of the American Society for Steel Treating held its first meeting of the 1924-1925 season in the blue room of the William Penn Hotel on Tuesday, Sept. 2. The meeting, which was well attended, was addressed by Dr. N. B. Hoffman, metallurgist, Colonial Steel Co., who spoke on "Some Phases of the Metallurgy of Tool Steel." The paper brought out a very interesting discussion, the main points being graphitization through the breaking down of iron carbide, and the causes of decarburization during annealing.

The chapter has formed an "On to Boston" club, and expects to send a large representation to the annual convention at Boston, Sept. 22 to 26. Arrangements are being made to have special cars attached to Boston trains. Officers of the chapter are: DuRay Smith, chairman, Union Spring & Mfg. Co., New Kensington, Pa., O. B. McMillan, vice-chairman, Pittsburgh Rolls Corporation, Pittsburgh, and H. L. Walker, secretary-treasurer, 1102 Linden Place, N. S. Pittsburgh.

The Crucible Steel Co., Syracuse, N. Y., is increasing production at its Holcomb Works, and has started up three 6-ton melting furnaces which have been idle throughout the summer.

The Structure of Troostite and Sorbite

Method of Etching Which Develops the Actual and Complex Constituents of Carbon Steels at High Magnifications

BY O. V. GREENE

LACK of adequate information in technical literature and numerous requests for information led to the institution of this investigation. It had for its purpose the development of the actual structures of the complex constituents of carbon steels. The steels used were quenched and drawn at various temperatures that had been arranged with a view of producing troostite and sorbite in them. Physical tests were used to correlate the microstructure with the physical properties.

The Scope of the Investigation

The steel used for this investigation had the following composition:

Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Silicon, Per Cent
0.824	0.330	0.036	0.014	0.106

Nickel and chromium were also present in small amounts.

The heat treatment was as follows[1]: The stock, 1 in. round, was normalized by heating to 1650 deg. Fahr. during 4 hr., soaking at 1650 deg. Fahr. during 4 hr., and then quenched in oil. The stock was then reheated to 1450 deg. Fahr., held 1 hr., with half of the specimens quenched in oil and half in water. The pieces were then drawn at 100-deg. intervals from 600 to 1300 deg. Fahr.

The physical properties were characteristic of carbon steel with these heat treatments. For example:

Draw Temperature, Deg. Fahr.	Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elong., Per Cent	Red. of Area, Per Cent	Brinell
600	134,500	187,500	11.0	32.4	388
900	127,500	169,000	13.5	36.5	342
1,100	90,500	129,000	20.0	47.2	249
1,300	75,250	101,000	23.5	54.7	198

A modification of Archer's[2] method was employed for etching the specimens. The solution used was freshly prepared 1 per cent picric acid in ethyl alcohol. After the specimen was etched for perhaps 5 or 10 min. in this solution it was then removed and the carbonaceous smudge rubbed off on moist broadcloth. The precautions to use against tarnishing and over-etching have been given in a previous article[3]. They are briefly summarized as follows:

> Care should be exercised against over etching, because the structure will be obliterated or deeply pitted if the specimen remains only 30 seconds over the time necessary to develop the desired results. This is best controlled by examining the specimen at various times during the etching, until the desired condition is obtained. Tarnishing is even more serious and difficult to overcome than over etching. It will always take place unless the specimen is washed with alcohol upon its removal from the etching solution and kept wet with alcohol while being rubbed on the broadcloth. The specimen must then be washed in hot water and dried in an air blast. It should be photographed as soon as possible, for tarnish will appear quickly even in a dessicator.

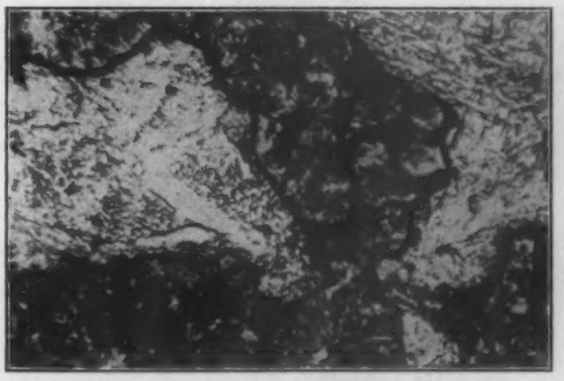


Fig. 1—Troostite (Dark) and Martensite (Light) x 500, Etched in Two Per Cent Nitric Acid in Ethyl Alcohol

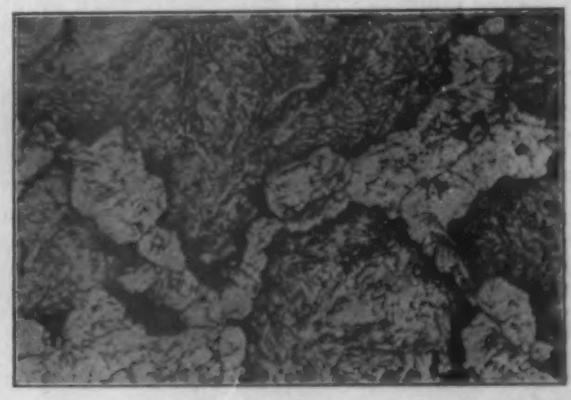


Fig. 2—Troostite (Light) and Martensite (Darker with Characteristic Acicular Structure), x 500, Etched in One Per Cent Picric Acid in Alcohol

Explanation of Photomicrographs

Two widely different methods of preparing a troostitic structure for examination are shown in Figs. 1 and 2. Fig. 1 shows troostite dark and martensite light, X 500, etched in 2 per cent nitric acid in alcohol. The troostite with this method of etching becomes dark, structureless masses. This structure is characteristic of troostite as given in any textbook. When, however, the same specimen is etched by the method described in this article the troostite will lose its dark, structureless appearance and assume a very definite granularity, even at magnifications as low as 500 dia., as can be seen from Fig. 2. Fig. 2 is the same speci-

THE author of this article is metallurgist for the Philadelphia & Reading Railway Co., Reading, Pa. The results of recent X-ray analyses of the hardened constituents of carbon steel are substantiated microscopically in this investigation, says the author. As nothing has appeared previously in this country in the technical literature on the true microscopic portrayal of troostite and sorbite, the author feels that this contribution should be particularly interesting.

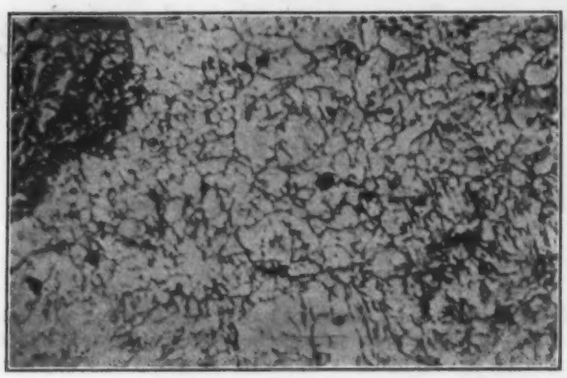


Fig. 3—Troostite (Light) and a Small Spot of Martensite (Dark), x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 600 deg. Fahr. The minimum amount of free Fe_3C is present

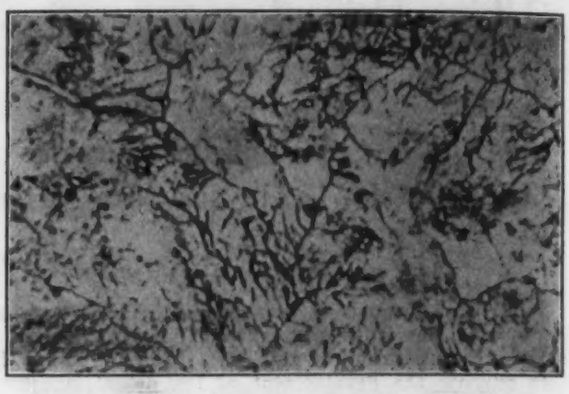


Fig. 4—Troostite, Showing Characteristic Grain Boundaries, x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 600 deg. Fahr. The minimum amount of free Fe_3C is present

men as Fig. 1, etched in 1 per cent picric acid in alcohol, X 500, showing troostite light with grain markings distinguishable, surrounded by martensite slightly darker with its characteristic acicular structure.

The structure of the troostite at higher magnifications will be given the other photomicrographs. They show troostite to be an agglomerate formed from the finely dispersed ferrite and cementite that was present in the martensite. The ferrite is no longer in a finely divided state, due to the fact that the network of the cementite lattice has been broken down, which allows the ferrite to agglomerate in large masses, forming a solid suspended solution with the cementite. Some of the cementite has become isolated particles of free Fe_3C instead being in solid solution with the ferrite. These increase in number and size with the drawing temperature.

Fig. 3 shows troostite light and martensite dark, X 1000, etched in 1 per cent picric acid, drawn at 600 deg. Fahr. The martensite remaining in the specimen is in isolated spots completely surrounded by troostite. A minimum amount of free Fe_3C as nodules is present in this specimen.

Fig. 4 shows troostite, X 1000, etched in 1 per cent picric acid, drawn at 600 deg. Fahr. This is the characteristic structure of troostite for this drawing temperature, showing its grain boundaries and few nodules of Fe_3C.

Fig. 5 shows troostite light and martensite dark, X 1000, etched in 1 per cent picric acid, drawn at 800 deg. Fahr. In this specimen the process of the growth of troostite through the martensite can be seen. In the lower right hand corner of the troostite may still be seen a shadow-like marking caused by a recent or incomplete growth of troostite in the martensite.

Fig. 6 shows troostite light and martensite dark, X 1000, etched in 1 per cent picric acid, drawn at 900 deg. Fahr. The troostite is shown growing through and surrounding the remaining martensite. The free Fe_3C is appearing here in larger amounts than in Figs. 3 to 5 inclusive.

Fig. 7 shows troostite light and martensite dark, X 1000, etched in 1 per cent picric acid, drawn at 1000 deg. Fahr. The nodules of free Fe_3C have increased here more than Nos. 3 to 6 inclusive. The last of the martensite is being broken down into troostite here. No martensite appears in the following specimens.

Fig. 8 shows troostite, X 1000, etched in 1 per cent picric acid, drawn at 1100 deg. Fahr. There was no martensite present in this specimen. The troostite is losing its grain size here and contains more of the free Fe_3C than in previous specimens.

In the last two photomicrographs, Figs. 9 and 10, the result of applying this method of etching to a sorbitic steel is shown. Using this method of attack, sorbite is seen to have a definite structure composed of ferrite still containing some Fe_3C in solid solution and disperse spheroidal particles of free Fe_3C. The cementite nodules are in a greater number and are slightly larger than in the previous specimens. Therefore, sorbite is simply a little more of a progression in the agglomeration from the martensite than the troostite was.

Fig. 9 shows sorbite, X 1000, etched in 1 per cent picric acid, drawn at 1200 deg. Fahr., showing sorbite as a finely divided pearlite, most of the constituents of which are present as a conglomerate.

Fig. 10 shows sorbite, X 1000, etched in 1 per cent picric acid, drawn at 1300 deg. Fahr. The cementite nodules are slightly larger here than in Fig. 9.

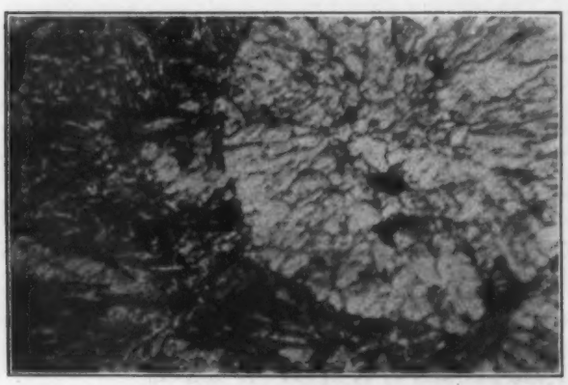


Fig. 5—Troostite (Light) and Martensite (Dark), x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 800 deg. Fahr.

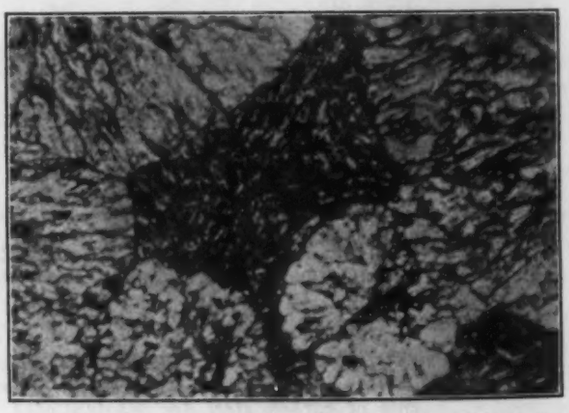


Fig. 6—Troostite (Light) and Martensite (Dark), x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 900 deg. Fahr.

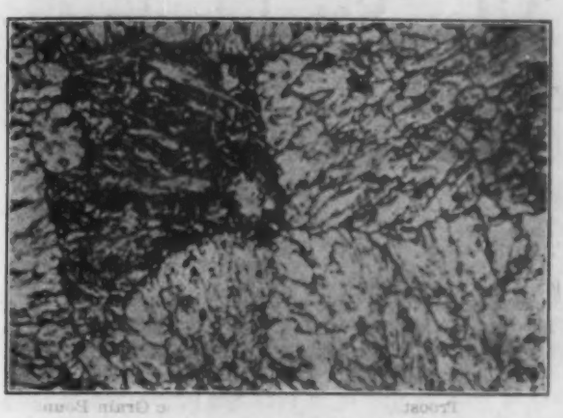


Fig. 7—Troostite (Light) and Martensite (Dark), x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 1000 deg. Fahr.

Fig. 8—Troostite, x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 1100 deg. Fahr. More of the free Fe_3C appears here than was present in the previous photo micrographs

It is interesting to note that in the development of technique in microscopy and etching of steels very little work has been directed along the lines of the common constituents of hardened carbon steels. Because of this the appearance of troostite (Fig. 1) and sorbite as structureless dark etching masses has been taken more or less for granted, and technical writers present them in this manner, with the exception of an article printed in *Stahl und Eisen* about April 26, 1924, which appeared over a year after the completion of this investigation. As a consequence nearly every conceivable hypothesis has been suggested for the true nature of their structures. However, if the method of etching described in this article be used the troostite will lose its structureless appearance, and easily distinguishable grain boundaries within the troostitic masses will be seen at magnifications as low as 500 dia. (Fig. 2). The sorbite also is seen to have a definite structure (Figs. 9 and 10).

Various authors have suggested that the composition of these constituents may be: Iron in the alpha, beta or gamma forms, or in two or in all three of these forms, while the carbon may be present as carbide in solution or free crystallized Fe_3C, or both. Arnold, Rosenhain and Benedicks, as quoted by Rosenhain, all agree fairly closely that troostite and sorbite are simply pearlites, the constituents of which are so small that they cannot be detected by the microscope. These investigators, in the order named, think they are emulsified pearlites, an alpha or beta iron in which the separated Fe_3C is present in slightly larger masses than in the martensite, or a colloidal suspension of the cementite in iron.

Sauveur writes that the constituents of troostite and sorbite are: Free crystallized Fe_3C, carbide in solution, beta iron because of its hardness, and alpha iron because of its magnetism. However, in the author's estimation, the beta iron theory of hardness is obsolete.

Maurer[4] refutes this theory probably better than any one. He states that effective hardening takes place when the alpha particles, arising from the gamma iron particles, are constrained to take up a greater volume than is normal to them, by the greater volume of the carbon in solution. The hardness is the resultant of the effort of the alpha particles to assume their ordinary volumes and the effort of the carbon in solution to compel them to assume volumes suitable for it. If the process takes place rapidly the alpha particles will be in a cold worked condition, which explains the similarity in properties of cold worked and hardened materials.

Recent X-Ray Work

The results of recent X-ray work on the structures of the hardened constituents of carbon steels coincide with the results of this investigation, which are as follows:

X-ray investigation shows martensite to be alpha iron split up into cells by the Fe_3C lattice. The particles are so finely divided that they may be regarded as having colloidal dimensions. A disperse system, such as this, has properties that are similar to the properties of cold worked materials. This is a slightly different point of view from the one given by Maurer above.

It follows that an aggregate of larger particles of

(*Concluded on page 670*)

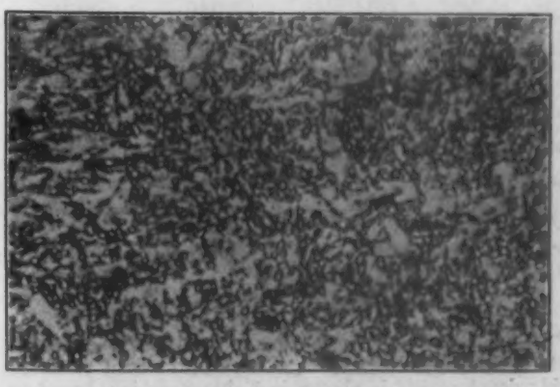


Fig. 9—Sorbite, x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 1200 deg. Fahr. Showing finely divided ferrite and cementite

Fig. 10—Sorbite, x 1000, Etched in One Per Cent Picric Acid in Alcohol. Drawn at 1300 deg. Fahr., showing finely divided ferrite and cementite with the cementite nodules slightly larger here than in Fig. 9

Growth of American Alloy Steel Industry

Large Expansion in Last Two Years—Statistics Since 1909 Reviewed—Pronounced Increase in Electric Alloy Steels

BY EDWIN F. CONE

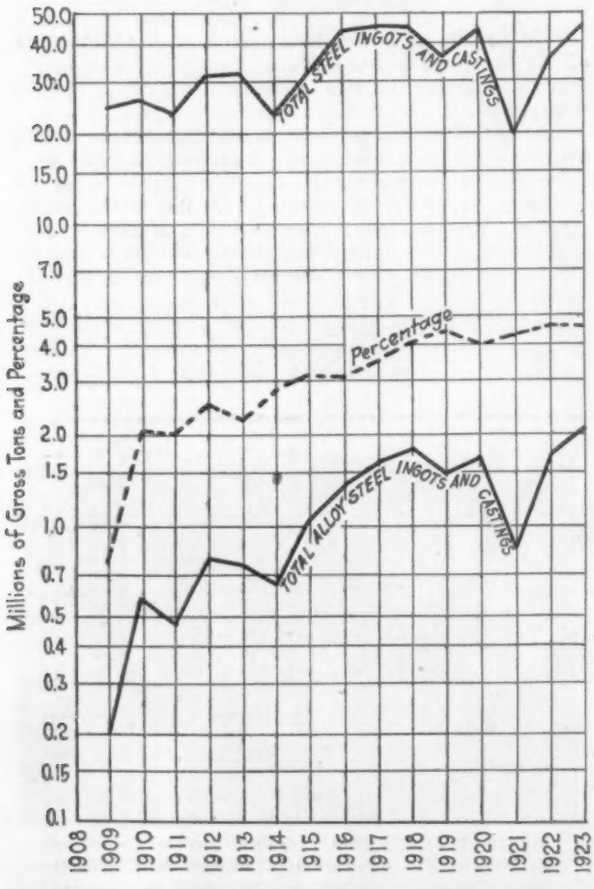
A NEW record in the alloy steel industry of the United States was made in 1923. More alloy steels of all kinds, in proportion to the total steel output of the country, were made last year than in any year since alloy steel came into use commercially. From their introduction on a small scale, such steels have advanced in importance year by year until today they are indispensable to many industries.

Prior to 1909 practically only simple carbon steels were made, either as ingots or castings. The quantity of alloy steels was so small that they were not recognized previous to that in annual statistics. Of course, high-speed steels were an exception to this statement, but in tonnage these did not mount up.

This article presents a review of the progress of the American alloy steel industry in general, based on an analysis of the data of the American Iron and Steel Institute. It supplements a similar article, published in THE IRON AGE, Sept. 28, 1922, and covers developments of the years 1922 and 1923. The alloy steel casting industry is discussed, particularly the progress made in the output, year by year, of electric alloy steels as a whole and electric alloy steel castings.

Expansion of the Entire Alloy Steel Industry

The feature of the development of the alloy steel industry in the last two years has been the expansion in production. In 1923 more alloy steel of all kinds was made than in any previous year—2,106,489 gross tons. The next largest production was 1,787,852 tons in the war year, 1918. The next largest peace-time output was 1,673,496 tons in 1922. The striking fact, however, is that in 1923, as well as in 1922, the percentage of alloy steel of the total ingot and castings output of the country expanded to 4.70 per cent, as compared with the best previous record of 4.27 per cent in 1919.



How the Proportion of Alloy Steel to the Total Steel Produced Has Been Gradually Increasing. The use of the ratio chart makes the rates of fluctuation truly comparable

Table 1—Production of Steel Ingots and Castings and of Alloy Steel Ingots and Castings in the United States

	Total Steel, Gross Tons	Alloy Steel, Gross Tons	Alloy Steel of the Total, Per Cent	Tons of Total Steel to 1 Ton Alloy Steel
1909.....	23,955,021	181,980	0.75	131.6
1910.....	26,094,919	567,819	2.17	45.9
1911.....	23,676,106	481,459	2.03	49.1
1912.....	31,251,303	792,501	2.53	39.4
1913.....	31,300,874	714,357	2.28	43.8
1914.....	23,513,030	646,953	2.75	36.3
1915.....	32,151,036	1,021,147	3.17	31.4
1916.....	42,773,680	1,362,615	3.18	31.3
1917.....	45,060,607	1,644,335	3.65	27.4
1918.....	44,462,432	1,787,852	4.02	24.8
1919.....	34,671,232	1,481,188	4.27	23.4
1920.....	42,132,934	1,660,292	3.94	25.3
1921.....	19,783,797	809,548	4.10	24.3
1922.....	35,602,926	1,673,496	4.70	21.2
1923.....	44,943,696	2,106,489	4.70	21.3

The increase in the proportion of alloy steels produced has been gradual but steady since 1909. The actual figures are given in Table 1 and the development is shown graphically by one of the charts. In its infancy, or in 1909, the alloy steel production was only 0.75 per cent of the total steel output. This had expanded about threefold by 1913 and over six and one-quarter times by 1923, or in 15 years.

Expressed otherwise, the rate of production of total steel to alloy steel in 1909 was over 130 to 1, or there were about 130 tons of steel ingots and castings made for every ton of alloy steel. The last column of Table 1, giving these ratios, shows that the alloy steel industry received its impetus in 1910.

Table 2—Production of Total Alloy Steel and of Alloy Steel Castings in the United States

	Total Alloy Steel, Gross Tons	Total Alloy Castings, Gross Tons	Percentage of Castings of Total
1909.....	181,980	23,002	12.64
1910.....	567,819	29,357	5.17
1911.....	481,459	56,290	11.69
1912.....	792,501	103,109	13.01
1913.....	714,357	88,927	12.44
1914.....	646,953	69,846	10.79
1915.....	1,021,147	97,896	9.58
1916.....	1,362,615	56,458	4.14
1917.....	1,644,335	67,529	4.10
1918.....	1,787,852	66,485	3.71
1919.....	1,481,188	45,372	3.06
1920.....	1,660,292	68,353	4.11
1921.....	809,548	40,255	4.97
1922.....	1,673,496	59,104	3.53
1923.....	2,106,489	92,220	4.37

The Alloy Steel Casting Industry

An interesting phase of this analysis is the extent to which alloy steels have been incorporated in castings. This development is shown in Table 2, which, based on the same statistics, gives the total alloy steel and the total alloy steel castings output during the last 15 years.

If the record of 1921 is eliminated, which was an abnormal year in many respects, 1923 recorded a sub-

stantial advance in the proportion of alloy castings to the total alloy steel. In 1923 this was 4.37 per cent, or the largest since 1915, excepting 1921.

In this field of the alloy industry an unusual comparison between present and pre-war tendencies exists. With the exception of 1910, during each year from 1909 to 1915 inclusive, a much larger tonnage and percentage of alloy castings was made than for any year since. A much smaller proportion has been made as castings from 1916 to the present time. For the six years (omitting 1910) prior to 1916, this percentage of alloy steel castings of the total alloy steel averaged 11.69 per cent, while from 1916 to 1923 inclusive this average has been about 4 per cent. Singularly in the depression of 1921 the percentage was 4.97 per cent, the largest of any of recent years.

The explanation offered when this subject was discussed two years ago is unchanged now:

> In the few years just prior to 1915 a very large quantity of cast steel frames for locomotives was made containing vanadium. Many of the railroads ordered them, partly as an experiment and partly as regular equipment. This, of course, ran the total of alloy castings into large figures as each engine frame was very heavy. While this practice by the railroads still continues, it possibly does not represent so large a tonnage as formerly. This may account in part for the difference referred to. The more reasonable conclusion is, however, that the increased use of alloy steels has been in rolled and forged material which has consequently cut down the proportion of castings in the total.

Table 3—Production of Total Alloy Steel and of Alloy Steel in Electric Furnaces in the United States

	Total Alloy Steel, Gross Tons	Electric Alloy Steel, Gross Tons	Electric Alloy Steel of Total Alloy Steel, Per Cent
1909	181,980	.....	...
1910	567,819	608	0.11
1911	481,459	.....	...
1912	792,501	9,619	1.21
1913	714,357	11,264	1.57
1914	646,953	9,344	1.44
1915	1,021,147	27,944	2.73
1916	1,362,615	71,129	5.22
1917	1,644,335	130,578	7.94
1918	1,787,852	290,961	16.26
1919	1,481,188	181,632	12.26
1920	1,660,292	245,572	14.78
1921	809,548	63,246	7.81
1922	1,673,496	125,419	7.49
1923	2,106,489	194,976	9.25

In the light of recent developments the 1924 record will probably show a marked change from that of the past eight years, as the tendency to use heavy castings of alloy steel is increasing considerably.

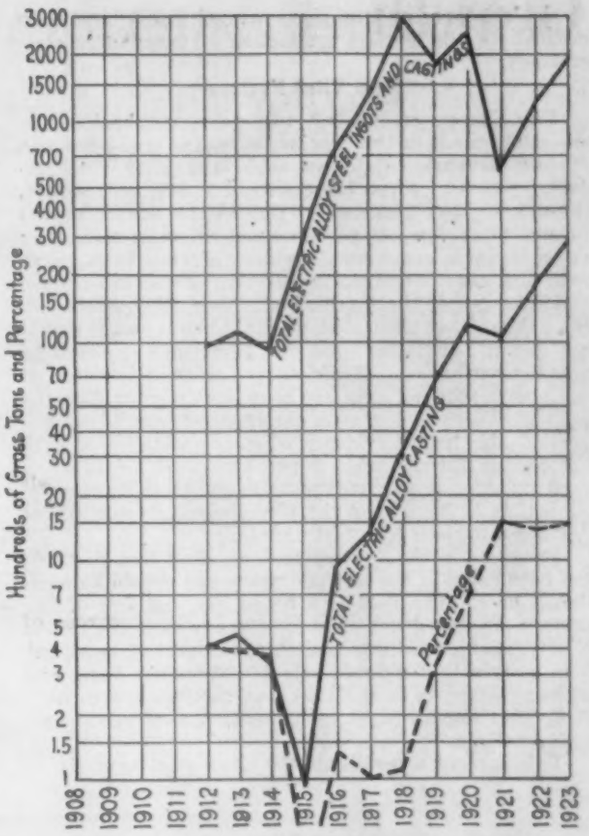
Alloy Steels from Electric Furnaces

The electric furnace phase of the American alloy steel industry presents some interesting features. Taking electric alloy steels as a whole and comparing the output with the total alloy steel made, the record for the last 15 years is arranged in Table 3, according to official data.

The feature is the decided expansion in 1923, when 9.25 per cent of the total alloy steel production was made in electric furnaces, the increase over 1921 and 1922 being considerable. Ten years ago the percentage was only 1.57 per cent. The country's electric steel industry did not assume any real prominence until 1912, since which time the growth has been rapid. A significant fact in this growth, however, is that the expansion in electric alloy steel output has been larger in the years immediately following the war than during the war period, except possibly in 1918. Just why the years 1919 and 1920 should show a better record than the years since is difficult to explain. That a percentage of 7.81 per cent of electric alloy steel should have been made in such a poor economic year as 1921 is interesting.

Electric Alloy Steel Castings

Two years ago the rapid growth of the production of alloy steel castings in electric furnaces was characterized as the most remarkable development up to that



Castings of Electric Alloy Steel Have Rapidly Been Increasing in Tonnage and in the Percentage of All Alloy Steel Made in Electric Furnaces

time. It appeared first in 1921. Developments since have shown that this was not spasmodic. The real facts are brought out in Table 4 and in the second chart.

While the percentages in 1922 and 1923 are not quite so large as in 1921, or 14.20 per cent and 14.90 per cent respectively, against 15.94 per cent in 1921, they are so much larger than in any years previous to 1921 that it is safe to say that the increase registered in 1921 has become an established one.

During the war the relative tonnage of electric alloy steel castings was even smaller than before the war, but by 1918 such castings came into demand and from 3.33 per cent of electric alloy castings made in 1919 the expansion has continued until in the last three

Table 4—Production of Total Alloy Steel and of Alloy Steel Castings from Electric Furnaces in the United States

	Total Electric Alloy Steel, Gross Tons	Electric Alloy Castings, Gross Tons	Electric Alloy Castings of Total Alloy Steel, Per Cent
1909	.....	.....	...
1910	608	8	1.32
1911	.....	.....	...
1912	9,619	402	4.18
1913	11,264	443	3.93
1914	9,344	340	3.64
1915	27,944	96	0.34
1916	71,129	926	1.30
1917	130,578	1,296	0.99
1918	290,961	3,076	1.05
1919	181,632	6,057	3.33
1920	245,572	11,710	4.77
1921	63,246	10,084	15.94
1922	125,419	17,760	14.20
1923	194,976	29,054	14.90

years an average proportion of about 15 per cent has been reached.

In 1923 the quantity of such material reached 29,054 tons. The fact that this total is more than that of any previous two successive years emphasizes the growth in use of electric alloy steel castings. One cause has been, and is, the constantly greater use of heat-treated electric alloy steel castings in place of regular forgings. Another factor is the production of manganese steel castings in the electric furnace instead of the converter.

In the last three or four years several plants have been erected for the electric production of manganese steel castings.

Two Vital Factors

The history of the last two years emphasizes the statement made in this review two years ago—that two modern developments have made the alloy steel industry possible: First, the electric furnace, and, second, the art of heat treatment. Before the advent of the former most ferroalloys were non-existent; now they are a common commercial product of electric furnaces with new ones developed frequently. These in turn are making possible the production of new alloy steels. In the field of heat treatment, so rapid has been the development of processes and of knowledge concerning actual reactions and effects as well as the perfection of equipment that not only are alloy steels brought to the highest efficiency, but even carbon steels are being improved. No better evidence of the importance of both the electric furnace and of heat treatment to the alloy steel industry in particular and to the steel industry in general is at hand than the phenomenal growth of the American Society for Steel Treating.

Progress in the development of alloy iron castings has been rapid in the last two years and should be mentioned here. The field is a broad one and full of important possible developments. Details as to the extent of the expansion in this realm are not now at hand, but it is certain that considerable attention has been, and is, being given to it and that iron castings are capable of decided improvement by the addition of certain alloying metals.

To complete a review of the alloy steel industry in general, data from two other important fields are necessary, but not available. One is information as to the distribution of the various kinds of alloy steel—how much of each grade is made and into what various products they go. While the automobile industry has been the principal consumer of the more familiar grades of alloy steel, other industries are gradually increasing their use of them. As rolled or forged products such steels are now also a factor in locomotive construction, in agricultural implements, aircraft design and many other minor industries. As castings, the alloyed products are gaining in prominence in locomotives, in rolls for rolling mills, in mining equipment and other less prominent applications.

The other field, in which more information would be valuable, is the extent of the manufacture and use of alloy steels in foreign countries. No data for any of the large European steel industries are available. While alloy steels in Great Britain, France, Belgium, Luxemburg and Germany are extensively used, there seems to be no measure of the production, whether as ingots or castings, as related to the whole steel output. A comparison with the American alloy steel industry would be highly interesting. That the proportions of the total made in those countries is equal to those here is doubtful.

Predictions as to the future of the American industry are, of course, to be made with caution. Based on the course of the last two years and on the fact that there are one or two new developments which bear promise of fruitful results, the next few years should witness striking progress with expanding use of alloy steels, particularly those made by electric processes.

HIGH MANGANESE STEELS

British Results on Medium Carbon Steels with 1 to 5 Per Cent Manganese

Some work has been done by the research department at Woolwich, England, covering a study of the property of medium carbon steels having a high manganese content. These grades of steel have also been investigated in this country and the subject is an interesting one. The results of the British investigation have been issued through the stationery office, as R. D. Report No. 6. A brief extract is as follows:

The five steels included in the investigation were made by the crucible process. The ingots were reheated and forged into bars 2 in. by ¾ in. section. The carbon percentage was from 0.36 to 0.39 and the steel of maximum manganese content contained 5.25 per cent manganese. This steel could be forged with difficulty, but the surface was very imperfect and showed numerous cracks. It was difficult to obtain this steel in anything but a martensitic condition and the manganese content was evidently much too high for steel for structural purposes. The steel with highest manganese content on which a complete series of tests was made contained 2.86 per cent manganese. A number of surface cracks were observed in this steel and this manganese content appeared to be near the limit of useful composition.

The bars were of the following compositions:

	A. Per Cent	B. Per Cent	C. Per Cent	D. Per Cent	E. Per Cent
C	0.37	0.39	0.36	0.39	0.39
Si	0.12	0.11	0.09	0.24	0.43
Mn	0.25	1.12	2.24	2.86	5.25
S	0.042	0.035	0.027	0.031	0.054
P	0.023	0.025	0.025	0.025	0.034
Ni	0.07	nil.	nil.	nil.	0.04
Cr	0.05	0.003	0.003	0.04	0.17

Heating and cooling curves were taken by the inverse-rate method of samples of the four steels after normalizing, temperatures being measured by means of a platinum platinum-rhoddium thermocouple and Carpenter-Stansfield potentiometer, and time intervals noted for every 0.025 millovolt, equivalent to about 2½ deg. C. The rate of heating employed was about 9 deg. C. per min. Cooling curves were taken from 800 and 900 deg. C. The conclusions arrived at were as follows:

> The critical points Ac_1 and Ar_1 are lowered by the presence of increasing amounts of manganese. Ac_3 and Ar_3 are lowered until they merge into Ac_1 and Ar_1 respectively. The presence of manganese tends to prevent the separation of ferrite and pearlite on cooling. The slowest permissible rate of cooling through the critical range to produce hardening and to suppress the separation of ferrite is much slower than that permissible for carbon steels. An increase in the initial temperature has little effect on the position of Ar_1 or on the hardness of the treated steel.
>
> After oil-hardening and tempering at 650 deg. C. all the mechanical properties of an 0.40 per cent carbon steel are improved by the presence of about 2 per cent manganese. The improvement in properties is still maintained with 2.86 per cent of manganese, but the additional manganese shows no advantage and may introduce difficulties in forging.
>
> The steels with high manganese content are extremely liable to show temper-brittleness when slow rates of cooling after tempering are employed, but this may be avoided by suitable treatment. If good impact figures are to be secured the cooling from the tempering temperature must never be slower than in air, and as the steels harden when quenched or quickly cooled from temperatures considerably below the beginning at Ac_1, as usually determined, a tempering temperature higher than 660 deg. C. should be avoided.
>
> For many purposes for which it is desired to replace carbon steel forgings by steels of greater strength the following composition may be suggested: Carbon, 0.35 to 0.40 per cent; manganese, 1.80 to 2.20 per cent; oil hardened from 800 to 850 deg. C.; tempered from 610 to 650 deg. C.; cooled in air, oil or water.

Standard Analytical Methods for Plain and Alloy Steels

Revised standard methods of chemical analysis for both carbon and alloy steel have been prepared by the American Society for Testing Materials. These methods cover the analysis which are called for in the chemical requirements given in the various specifications of the society for plain carbon and alloy steels. They are issued in two pamphlets: A 33-24, which covers plain carbon steel, and A 55-24, which covers the alloy constituents of alloy steels. The price of the pamphlets is 25c. each, and they can be obtained from the secretary-treasurer of the society, 1315 Spruce Street, Philadelphia.

Wire Drawing and Properties of the Steel

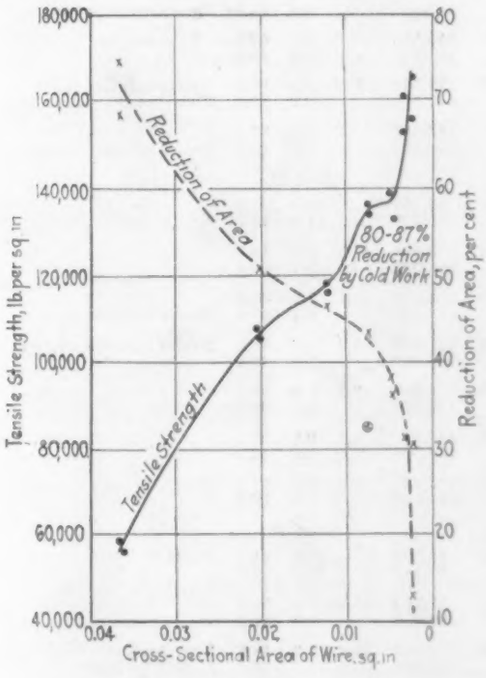
Some of the Changes Due to Progressive Cold Drawing— Static and Structural Effects Considered —Analogy with Copper

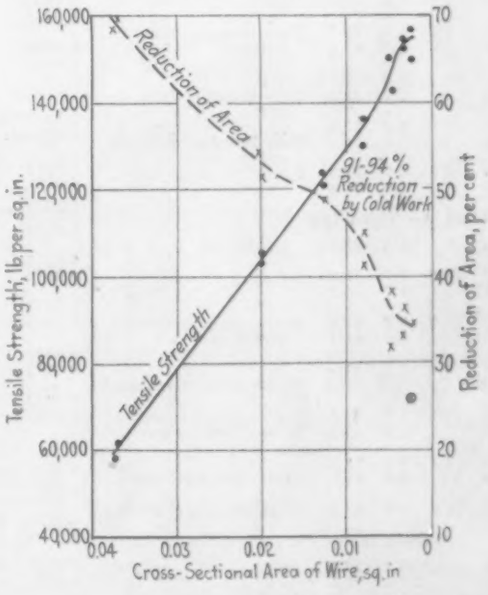
BY GEORGE F. COMSTOCK*

CONSIDERABLE work has been done to investigate the effect of progressive cold drawing on the strength of copper wire, especially by Alkins in England (*Jnl. Inst. Met.*, 1918, No. 2, p. 33, and 1920, No. 1, p. 381), who found that the effect did not increase regularly with the amount of drawing. Up to about 60 per cent reduction in area by cold drawing, the increase in strength was fairly uniform, but further drawing was found to give no additional strength until a certain amount was exceeded, after which the strength increased with the cold-work again, but at a different rate from the original increase.

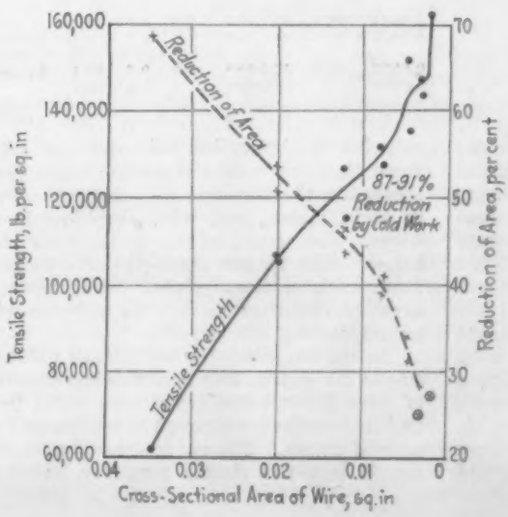
The writer has not seen in the literature any account of similar work done on steel, so that perhaps the following report of some tests on steel wire, showing a somewhat similar phenomenon to that demonstrated by Alkins in copper, may be of interest. The samples were obtained from two well-known wire manufacturers through G. A. White, formerly of the Titanium Alloy Mfg. Co., to whom the writer is indebted for suggesting the experiments and furnishing the material.

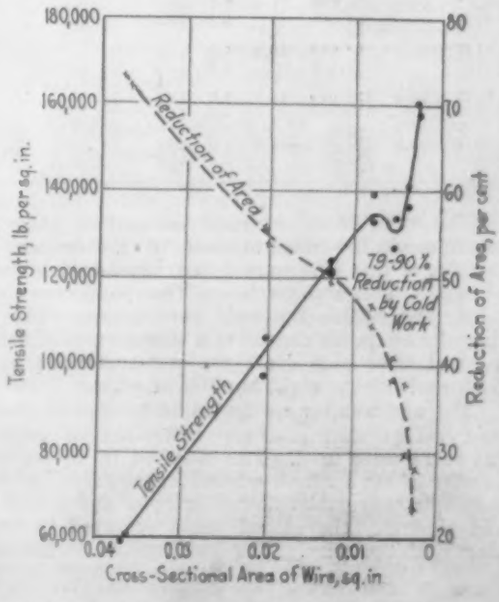
*Metallurgical engineer, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.


Reduction of Area
Tensile Strength
80-87% Reduction by Cold Work
Tensile Strength, lb. per sq. in.
Reduction of Area, per cent
Cross-Sectional Area of Wire, sq. in.


Reduction of Area
Tensile Strength
91-94% Reduction by Cold Work
Tensile Strength, lb. per sq. in.
Reduction of Area, per cent
Cross-Sectional Area of Wire, sq. in.

Tensile Strength and Reduction of Area Results for Heat "A," First (Left) Lot and Second Lot


Reduction of Area
Tensile Strength
87-91% Reduction by Cold Work
Tensile Strength, lb. per sq. in.
Reduction of Area, per cent
Cross-Sectional Area of Wire, sq. in.


Reduction of Area
Tensile Strength
79-90% Reduction by Cold Work
Tensile Strength, lb. per sq. in.
Reduction of Area, per cent
Cross-Sectional Area of Wire, sq. in.

Tensile Strength and Reduction of Area Results for Heat "A," Third Lot, (Left) and Heat "B"

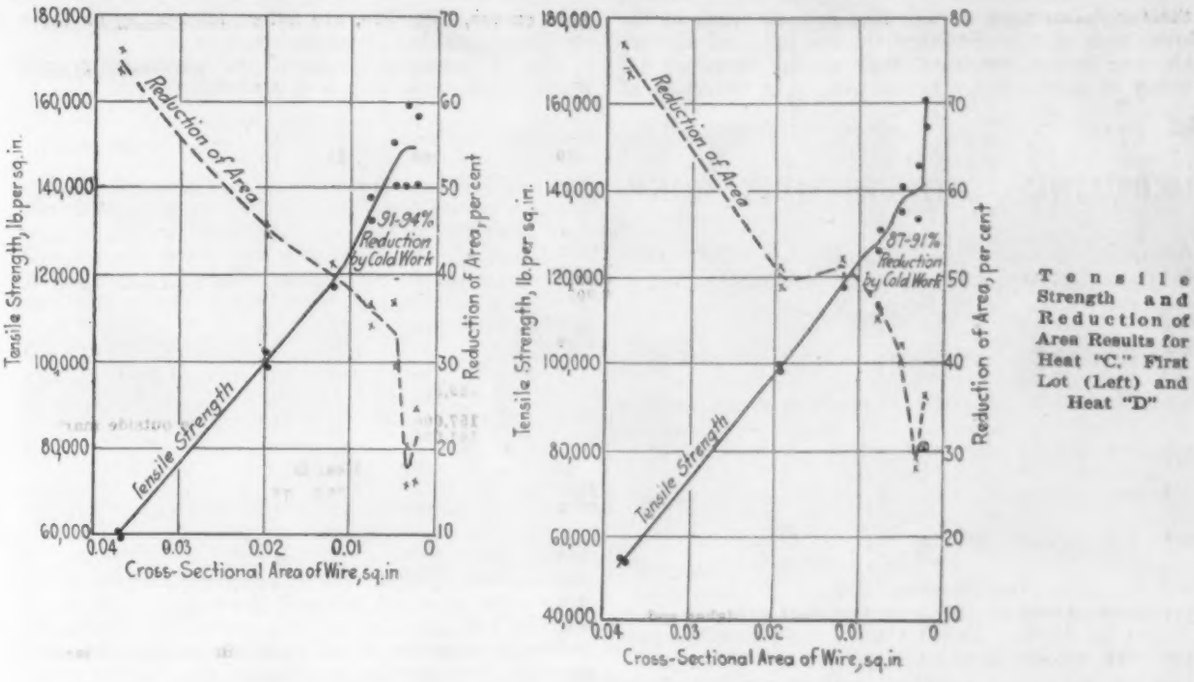
Table of Tensile Tests of Steel Wires Drawn to Different Thicknesses

Area of Cross-Section, Sq. In.	Aver. Red. in Area by Cold Drawing, Per Cent	Tensile Strength, Lb. per Sq. In.	Aver. Increase in Strength, Per Cent	Elongation in 8 In., Per Cent	Red. of Area, Per Cent	Remarks
Heat A—First Lot						
0.0363	None	56,400		23.0	74.5	Tested at higher speed.
0.0363		58,300		21.0	68.4	
0.0201	44.6	107,000	85.5	1.6	50.7	Tested at higher speed.
0.0201		105,700		1.5	50.7	
0.0123	66.1	116,000	10.0	1.2	46.3	Two breaks: first in grips.
0.0123		118,000		1.0	46.3	
0.0074	79.6	136,500	15.4	0.5	32.5	Broke at gage mark.
0.0074		134,000		0.9	43.3	
0.0047	87.1	133,000	0.7	0.5	36.2	Broke outside marks.
0.0047		139,000		0.9	38.4	
0.0032	91.3	152,500	15.4	0.4	3.1	Broke at gage mark.
0.0032		161,000		0.9	31.2	Two breaks: first in grips.
0.0023	93.8	156,000	2.5	0.6	13.0	
0.0023		165,500		1.0	30.4	
Heat A—Second Lot						
0.0373	None	59,300		24.2	68.6	Tested at higher spd.
0.0366		61,500		21.9	69.7	Tested at higher speed.
0.0199	46.0	105,000	72.1	1.7	51.3	
0.0201		102,800		1.5	54.2	Broke outside marks.
0.0127	65.7	124,000	17.9	1.2	48.8	Two breaks: first in grips.
0.0127		121,000		1.2	48.8	
0.0080	78.4	136,000	8.6	1.0	41.3	Two breaks: first in grips.
0.0080		130,000		1.0	45.0	
0.0047	87.3	150,000	10.2	0.9	32.0	
0.0047		143,000		0.7	38.4	Two breaks: first in grips.
0.0033	91.1	154,500	5.5	0.7	33.4	
0.0033		153,000		0.6	36.4	Two breaks: first in grips.
0.0023	93.9	157,000	—0.3	0.7	26.1	Broke in grips twice.
0.0023		149,500		1.0	34.8	
Heat A—Third Lot						
0.0346	None	61,900		24.2	68.5	
0.0201	42.0	105,000	70.9	1.7	53.8	
0.0201		106,500		1.7	50.7	
0.0121	65.1	127,500	15.0	0.6	43.8	Broke outside marks twice.
0.0121		115,500		1.5	46.3	
0.0075	78.1	128,000	7.0	1.2	41.4	
0.0077		132,000		0.5	39.0	Broke outside marks.
0.0047	86.8	136,000	10.8	0.7	34.1	Broke outside marks.
0.0045		152,000		0.2	31.2	Broke outside marks.
0.0032	90.8	144,500	1.4	0.6	28.2	
0.0032		147,500		0.5	25.0	Broke at gage mark.
0.0022	93.7	162,000	10.9	0.4	27.3	Broke at gage mark.
Heat B						
0.0370	None	59,200		20.2	73.3	
0.0363		60,500		20.2	72.0	
0.0201	44.8	106,000	70.4	1.7	53.8	
0.0204		97,500		2.0	55.9	
0.0127	65.4	124,000	20.4	1.2	51.1	
0.0127		121,000		1.2	49.6	
0.0079	78.5	133,000	11.0	1.0	46.9	
0.0079		139,000		0.9	44.3	
0.0054	85.3	134,000	—4.0	1.0	40.8	
0.0055		127,000		1.0	38.2	
0.0037	89.9	141,500	6.5	0.7	29.8	Broke outside marks.
0.0037		136,000		0.7	37.9	
0.0026	93.0	160,500	14.4	0.6	23.1	Broke outside marks.
0.0025		158,000		0.5	28.0	
Heat C—First Lot						
0.0366	None	59,400		20.1	76.0	Broke outside marks.
0.0370		60,000		23.7	73.4	
0.0199	46.0	102,000	68.3	1.0	55.8	Broke outside marks.
0.0199		98,700		1.7	54.8	Two breaks; first in grips.
0.0121	67.2	118,000	17.5	0.6	51.2	Broke outside marks.
0.0121		118,000		1.2	48.8	
0.0077	79.1	138,100	9.7	0.6	46.8	Broke outside marks.
0.0077		133,000		1.0	44.2	
0.0048	87.0	141,000	7.4	0.7	39.6	
0.0049		150,000		0.6	47.0	
0.0035	90.8	140,500	3.1	0.6	25.7	Broke outside marks.
0.0033		159,500		0.6	30.3	
0.0023	93.8	157,000	—0.7	0.4	34.8	Broke outside marks.
0.0023		141,000		0.5	26.1	
Heat D						
0.0373	None	54,100		25.0	73.5	
0.0380		54,400		27.5	76.9	
0.0194	48.5	99,800	82.3	1.7	49.0	
0.0194		97,900		2.0	51.0	
0.0119	68.4	121,000	20.9	1.0	50.4	
0.0119		118,000		1.2	52.1	
0.0077	79.6	123,000	6.3	1.1	45.5	
0.0077		130,500		0.6	46.8	Broke outside marks.
0.0050	86.8	135,500	8.7	0.7	42.0	
0.0050		141,000		0.9	40.0	
0.0032	91.5	133,500	0.7	0.5	28.2	Broke outside marks.
0.0031		145,000		0.7	29.0	Two breaks; first in grips.
0.0022	94.2	161,500	13.7	0.6	36.4	
0.0023		154,500		0.5	30.4	Broke at gage mark.
Heat E						
0.0373	None	59,300		24.4	71.0	
0.0380		59,700		23.5	72.6	
0.0199	47.4	106,000	81.4	2.0	46.7	
0.0196		109,000		2.2	48.0	
0.0123	67.6	123,000	15.1	1.5	42.3	
0.0121		124,500		0.7	43.8	Broke outside marks.
0.0071	81.2	129,000	6.7	0.6	38.0	Broke outside marks.
0.0071		135,000		1.0	40.9	
0.0045	88.1	154,000	9.8	0.9	31.2	
0.0045		135,500		0.7	35.6	
0.0033	91.6	147,000	4.1	0.9	18.2	
0.0031		155,500		0.6	16.1	
0.0022	94.2	175,000	10.6	0.5	13.6	Broke outside marks.
0.0022		159,000		0.5	18.2	
Heat F						
0.0377	None	58,100		19.2	71.1	Piped.
0.0377		57,100		24.5	69.0	
0.0199	47.2	93,700	67.4	1.2	56.3	
0.0199		99,000		2.2	57.3	
0.0121	68.0	114,000	20.4	1.2	48.8	Two breaks; first outside marks.
0.0121		118,000		1.2	49.6	
0.0079	79.1	125,000	5.2	1.2	44.3	
0.0079		119,500		1.0	46.8	
0.0047	87.9	135,000	11.5	0.9	38.4	
0.0044		137,000		1.0	31.8	
0.0035	90.8	144,000	5.9	0.9	34.4	
0.0035		145,000		0.7	28.6	Broke outside marks twice.
0.0023	94.0	154,000	6.9	0.6	26.1	Broke at gage mark.
0.0023		154,000		1.2	30.4	

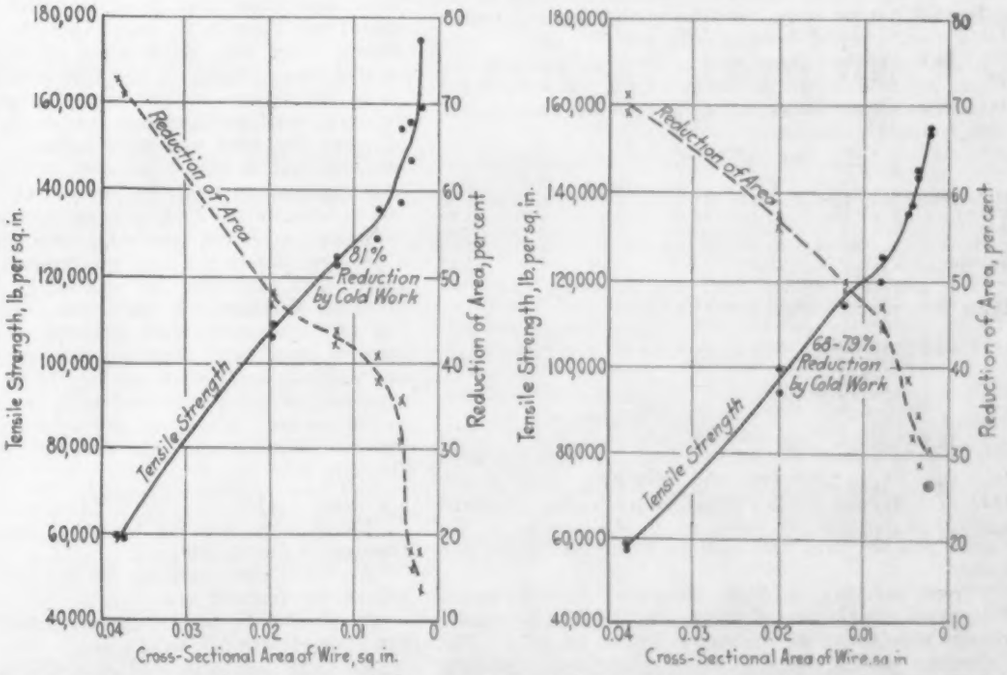
The steel was ordinary low-carbon basic open-hearth stock, hot-rolled to about ¼ in. diameter. Eight samples of this kind were tested, representing six heats of steel. Two test-specimens from each sample were taken just before the rods were drawn. They were then drawn in six stages to a diameter of about 0.054 in., and after each draft two test specimens were cut from each of the eight bundles of wire.

The specimens were tested in tension in the usual way, except that ordinary wedge-shaped grips with flat faces were used. This resulted in having quite a number of the specimens break in the grips, but in such instances the specimen was gripped and pulled again and generally the second break occurred in the free length of the wire. The yield points were recorded only for the hot-rolled rods and are not reported here since they have no particular bearing on the subject treated in this report. The elongations were measured in eight inches, and were very low in all the drawn wires. The results of the tensile tests are all tabulated below. The tensile strengths and reductions of area from each series are also shown plotted against the area of cross-section of the wire in eight diagrams accompanying this report.

In the diagrams the solid black points represent the tensile strengths, two points being shown for each size of wire because the tests were made in duplicate. A full line is drawn through the average position of each pair of points. The reductions of area produced in the tensile tests are plotted similarly, but with crosses and


Tensile Strength, lb. per sq. in.
Reduction of Area, per cent
Cross-Sectional Area of Wire, sq. in.
Reduction of Area
Tensile Strength
91-94% Reduction by Cold Work
87-91% Reduction by Cold Work

Tensile Strength and Reduction of Area Results for Heat "C," First Lot (Left) and Heat "D"


Tensile Strength, lb. per sq. in.
Reduction of Area, per cent
Cross-Sectional Area of Wire, sq. in.
Reduction of Area
Tensile Strength
81% Reduction by Cold Work
68-79% Reduction by Cold Work

Tensile Strength and Reduction of Area Results for Heat "E" (Left) and Heat "F"

dotted lines. The reductions of area of the few specimens that broke through the gage marks, or whose final fractures were in the grips, were not taken into consideration in drawing the curves, and such points are indicated by a cross surrounded by a circle. The reduction percentages written near the solid curves indicate the amount of cold drawing represented by the points immediately above the figures.

Considering first the tensile strength curves, it is seen that most of them show a more or less distinct break near a point corresponding to a cross-sectional area of wire of 0.005 sq. in. The curves for Heat A, 2nd lot; Heat C, 1st lot, and Heat E might perhaps be considered as smooth, but the others show distinctly two approximately straight portions of decidedly different slope, separated by the break mentioned, consisting of a short portion nearly horizontal. These results are therefore very similar to those obtained by Alkins with copper wire, except that the breaks were lower in his curves, or at about 60 per cent reduction in area by cold drawing instead of from about 80 to 90 per cent as in most of these tests. The figures written close to the curves give the percentage reduction by cold work at the break or horizontal portion of each curve. In Heat F this break occurred lower than in any of the others, while in Heat A, 2nd lot, and Heat C, 1st lot, it seems to occur just at the end of the curve, the upper part of different slope being apparently absent in these two. In Heat E, with no horizontal part of the curve, the portions of different slope join at about 81 per cent reduction.

The curves plotted by broken lines, showing the variation of reduction of area in the tensile test with different reductions by cold drawing, do not seem to agree very well, either with each other or with the tensile strength curves. They show in general two portions of different slope, indicating, as would be expected, a more rapid decrease of ductility as the wires were drawn down to the finer sizes than when they were less hardened by cold work. Except in the curve for Heat D there is hardly any suggestion of a horizontal portion, or break, in the reduction of area curves, and the break in that curve was probably accidental since it does not correspond with the break in

the tensile strength curve. The upward turns at the lower ends of this curve and the one for Heat C, first lot, may be also accidental since similar bends are not found in any of the other curves. The reduction of area curves, therefore, are not so interesting as those showing variations of tensile strength.

[In a subsequent section the photomicrographic phase of the investigation is described.]

PERTAINING TO FOUNDRY COKE

Analysis of Costs of Using High-Moisture and High-Ash Coke—Importance of Shatter Test

BY H. W. ANDERSON*

WHENEVER trouble occurs in the making of gray iron castings the foundryman invariably lays it on the coke. In some cases the coke is at fault but in the majority of cases one finds other items, such as rusty scrap, burnt iron and poor slagging, as the principal reason for foundry troubles.

One foundry using a certain kind of coke will obtain excellent results while a foundryman across the street will state emphatically that he has tried the same brand of coke and cannot use it. This condition should not be allowed to exist, as a good well-burnt coke giving good results in one shop will give the same results in another, provided the same conditions prevail. If the results are not satisfactory it is time to look into the cupola operation, such as quantity of air delivered, height of fuel bed, height of tuyeres, tuyere ratio, regularity, and size of charges.

Ideal coke is very hard, having little ash and sulphur, but this is impossible to obtain. The following tabulation shows the variations in coke and the designation I would give them:

	Bee-Hive			By-Product		
	Good	Fair	Bad	Good	Fair	Bad
Moisture	1.10	2.80	4.90	2.00	3.00	4.00
Volatile	0.90	1.10	1.30	0.90	1.10	1.20
Ash	7.60	10.70	15.00	7.00	12.00	17.00
Carbon	90.40	85.40	78.80	90.10	83.90	77.80
Sulphur	0.70	0.80	1.15	0.70	0.85	1.10

For general foundry work the following specifications will protect the buyer:

	Per Cent
Moisture, less than	3.00
Volatile matter, less than	1.15
Ash, less than	10.00
Sulphur, less than	0.85
Shatter test, above 65 per cent.	

The shatter test is important, as it tells how much fine coke to expect, due to handling. A high test coke will run 70 on this test and will give about 2 per cent of fine coke which cannot be used. Be on guard against a low-shatter coke, as it will crush in the cupola and the yard will have an accumulation of coke breeze.

Coke carrying a high moisture content means freight on several tons of water and the coke producers charge this water at the current price of coke. The following tabulation will make this clear. Taking coke No. 1 at $5 per ton, with freight rate of $1, and No. 2 at $4.50 with the same freight rate, using a 30-ton car in each case:

No. 1 at $5 per Ton with Freight Rate of $1

Analysis		Weight, Lb.	Freight	Invoiced as Coke
Moisture	1.10	660	$0.33	$1.65
Volatile	0.90	540	0.27	1.35
Ash	7.60	4,560	2.28	11.40
Carbon	90.40	...	...	...
Sulphur	0.70	...	...	...
Total	...	5,760	$2.88	$14.40
Freight and inert material total				$17.28

No. 2 at $4.50 per Ton with Freight Rate of $1

Analysis		Weight, Lb.	Freight	Invoiced as Coke
Moisture	4.90	2,940	$1.47	$6.62
Volatile	1.20	720	0.36	1.62
Ash	15.00	9,000	4.50	20.25
Carbon	78.90	...	...	...
Sulphur	1.00	...	...	...
Total	...	12,660	$6.33	$28.49
Freight and inert material total				$34.82

The difference between these cokes amounts apparently to $17.54 on 30-tons or 58c. per ton, but we must consider the cost of unloading and handling and charging this 7000-lb. of additional inert material, that it requires carbon from the coke to heat it to the fusion point, and that it makes an additional amount of slag to dispose of. The following table bases the price of coke on the carbon content and allows for the handling of excess material. It takes 90 per cent carbon coke as the standard:

Carbon Content Per Cent	Unit Value	Market Value of Coke at $5, Coke Value
90	100	$5.00
88	94	4.70
85	80	4.00
82	62	3.10
80	50	2.50
75	33	1.65
70	None	0.00

Recent improvements in the manufacture of by-product coke through the selection of low-ash coals render this material an attractive future in the foundry field. Some of this coke is being produced with an ash content of 6 per cent and there is no valid reason why the ash should exceed 10 per cent. In view of the enormous quantities of tar, ammonia and benzol wasted annually through the operation of the bee-hive ovens, it is imperative that steps be taken to curtail this waste, and there is no doubt that the time is not far distant when the conservation of this material will receive the attention of the Government.

In the course of this investigation a number of defective castings have been inspected; in the majority of cases the coke had been blamed. The inspection revealed that in only 5 per cent of these had the iron and coke been at fault; 85 per cent of the defects were due to careless molding, such as incorrect gating, poor ramming, mis-runs, run-outs, core shifts, etc. The 5 per cent due to the iron was located in the pig iron used. This particular car was badly oxidized and, on breaking the pigs, we found every one unsound and full of blow-holes. This kind of iron will cause a foundry more grief than any ten apprentice molders, as the whole day's work is likely to be ruined, and the only way of using this iron is at the rate of one pig to the charge. Whenever any oxidized pig iron shows up, get in touch with the furnace people and reject the car.

Summary

1.—Coke is not the principal cause of defective castings in the foundry.

2.—Hard coke containg 90 per cent carbon is excellent for foundry use.

3.—Hard coke containing less than 73 per cent carbon is worthless for cupola use.

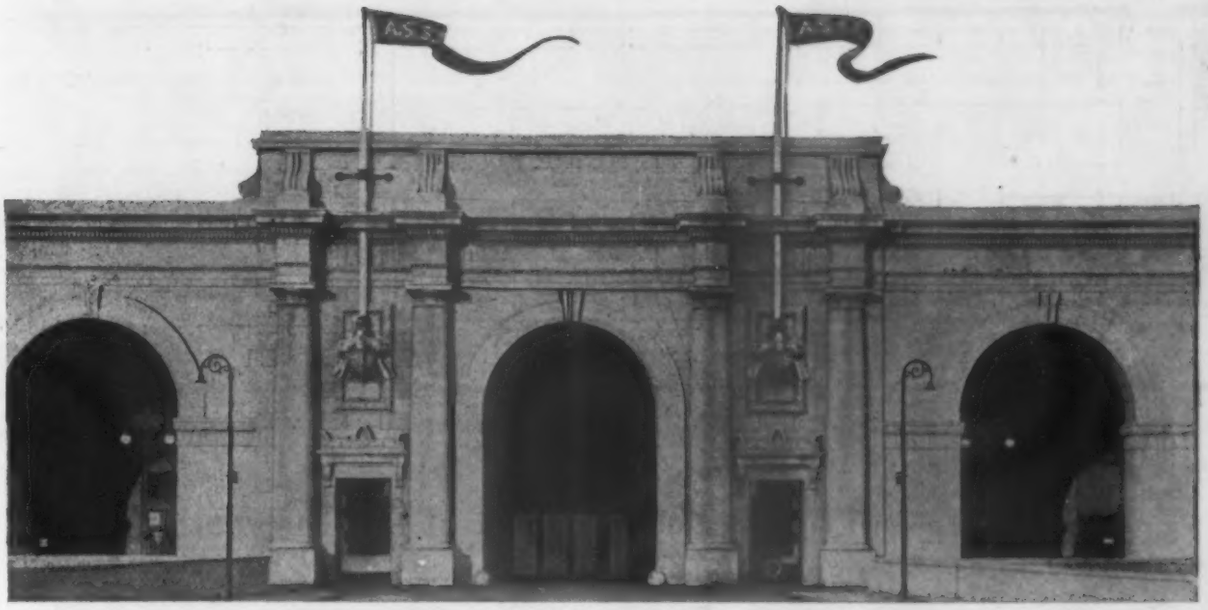
4.—Coke should be sold on a sliding scale, dependent upon the carbon content.

5.—By-product coke can be used in place of bee-hive coke with equally good results and eliminates the wastefulness of the bee-hive operation.

*Chairman Research Committee, Southern Metal Trades Association, Chattanooga, Tenn.

Loadings of revenue freight in the week ended Aug. 23 are reported by the American Railway Association at 982,248 cars, which is the highest figure for any week of the year. The increase from the previous week, itself a high record for the year, was 29,360 cars. In the corresponding week of last year, however, the total was 1,069,915 cars. The total loadings of this year, from Jan. 1 to Aug. 23, were 30,536,272 cars, or a reduction of about 5 per cent from last year's record-breaking 32,063,306 cars.

The cost of idleness in equipment industries is the subject of an article written by E. F. DuBrul, general manager National Machine Tool Builders Association, for the National Association of Cost Accountants, and available at 75 cents a copy on application to the latter named association, 130 West Forty-second Street, New York.



Entrance to the Commonwealth Pier, the Location of the International Exposition of the Steel Treaters

Steel Treaters' Week at Boston

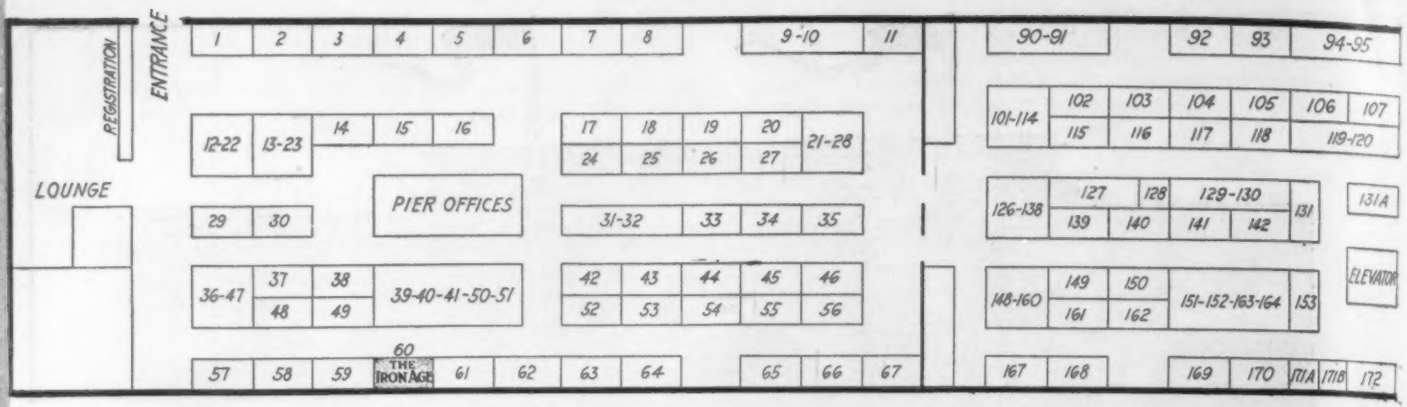
Sixth Annual Convention and International Exposition of the American Society for Steel Treating, Sept. 22 to 26

THE youngest American technical society—the American Society for Steel Treating—born only five years ago in Chicago, celebrates its sixth anniversary this year in Boston. Its expansion to a leading position in the technical world in so short a time has been remarkable.

As usual, a technical program of sterling merit, published in THE IRON AGE Aug. 7, has been prepared. Its presentation will follow the arrangement inaugurated last year at Pittsburgh, the sessions being held at the Copley Plaza Hotel, the headquarters, in the mornings, with special and less important programs scheduled for the afternoons in conjunction with the exposition. Probably the largest exposition of the kind ever held is located at the Commonwealth Pier. Over 165 exhibitors, covering a larger space than any previous affair, occupy this unique location. It will not be open during the forenoon. A complete account of the technical papers and the exposition will appear in THE IRON AGE, Oct. 2.

Several articles pertaining to the field of the heat treatment of steel, written by leading steel treaters and metallurgists, are published in the present issue of THE IRON AGE.

Relative Locations of Headquarters, Exposition and Stations. A is the Copley Plaza Hotel, convention headquarters; B is the Commonwealth Pier, location of the exposition; C, D, and E are South Station, Huntington Avenue Station and Back Bay Station respectively; F is the famous Boston Public Library



Floor Plan of the Major Portion of Commonwealth

Exhibitors and What They Exhibit at the International Steel Exposition

A

ABRASIVE MACHINE TOOL CO., East Providence, R. I. Section C, booth 205. A No. 3 Abrasive surface grinder, equipped with exhaust system, magnetic chuck and self-contained generator for operating same; motor driven. A No. 33 Abrasive vertical spindle surface grinder, equipped for wet grinding, magnetic chuck and self-contained generator for operating same; motor driven. Various units of each machine to illustrate construction. In attendance: Norman D. MacLeod, C. Gordon MacLeod, Kenneth B. MacLeod and Harry H. Flint.

ACME MACHINE TOOL CO., Cincinnati. Section C, booth 221. A Cincinnati Acme No. 2 Universal flat turret lathe featuring the production possibilities of this type of machine. Machine tooled up to produce parts. In attendance: Charles Meier, works manager; A. T. Stehn, service engineer, and Carl Linden, factory sales engineer.

ADAMS & DURKEE STEEL CO., INC., Boston. Section A, booth 55. Samples of bar steel, tubing, spring wire and small tools. In attendance: Messrs. Adams, Durkee, Osgood, Howard and Ruef.

AIR REDUCTION SALES CO., New York. Section B, booths 134 and 144. Airco-Davis-Bournonville specially designed machines for oxyacetylene cutting. Airco oxygen. Airco acetylene. Airco-Davis-Bournonville hand welding and cutting apparatus and other Airco products. In attendance: L. Edwards, J. A. Shand, P. Wilder, G. Jaeger and G. Van Alstyne.

CHARLES G. ALLEN CO., Barre, Mass. Section C, booth 237. A four-spindle Allen ball bearing drilling machine with power feed and lubricating equipment. A two-spindle Allen ball bearing drilling machine with silent chain motor drive. A single one-spindle plain bearing drilling machine. In attendance: Harding Allen.

AMERICAN GAS ASSOCIATION, New York. Section A, booths 19 and 20. Literature with reference to the use of gas for industrial purposes. In attendance: N. T. Sellman, assistant secretary-manager.

AMERICAN GAS FURNACE CO., Elizabeth, N. J. Section A, booths 9 and 10. Continuous heating machine; automatic quenching tank; carbonizing machine. Automatic temperature controllers. High speed steel hardening furnace and lead and cyanide hardening furnace. Brass melter; burners and blowpipes. High heat test furnace. Small high pressure gas booster. Display of furnaces and heating machines. In attendance: Gustav Schwab, Theodore Farwick, Sr., John Mehrman, Theodore Farwick, Jr., Edward D. Knapp, S. P. Rockwell and W. D. Fuller.

AMERICAN METALLURGICAL CORPORATION, Boston. Section B, booth 98. An electric heat treating furnace (open resistor box type) and an electric lead and cyanide pot type furnace. In attendance: K. A. Juthe, president and general manager; Albert J. Hanson, chief engineer; Stanley N. Juthe, sales manager; Arthur C. Wright, sales engineer, and William Walker, works superintendent.

AMERICAN STAINLESS STEEL CO., Pittsburgh. Section A, booth 52. A varied assortment of articles made from stainless steel. In attendance: John C. Neale, president, and C. S. Bunting, secretary-treasurer.

AMERICAN TOOL WORKS CO., Cincinnati. Section C, booth 237. A 20-inch American heavy service backgeared crank shaper arranged for motor drive through a 4-change speed box. A 12 x 5 in. American high duty lathe with patented 12-speed geared head arranged for self-contained motor drive with motor mounted in leg, taper attachment, Universal relieving attachment, oil pan and cooling equipment. A 3-in. American high-speed sensitive radial drill with tapping attachment and plain box table arranged for motor drive with motor mounted on rear of arm. A 2½-in. American high-speed, ball-bearing radial drill with round table arranged for motor drive through a 6-change speed box. A 20 x 10-in. American high-duty lathe with patented 12-speed geared head arranged for motor drive, high-duty screw tool post. A 4-in. American triple plain radial drill with plain box table arranged for motor drive through an 8-change speed box. In attendance: H. W. Schatz and F. L. Stubenroth, demonstrators.

AMERICAN TWIST DRILL & TOOL CO., Detroit. Section B, booth 161. High speed twist drills. In attendance: C. G. Munn and S. Sowder.

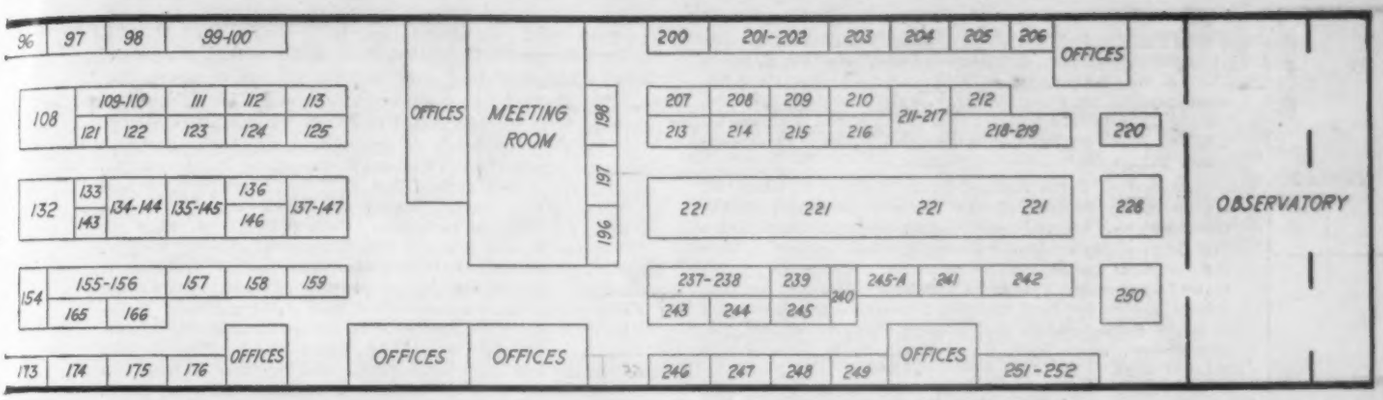
ARMSTRONG-BLUM MFG. CO., Chicago. Section B, booth 139. Marvel metal-cutting machines; automatic high-speed saw; metal band saw; portable hack saw machines; punching, shearing and bending machines. In attendance: Harry J. Blum, secretary.

ARMSTRONG CORK & INSULATION CO., Pittsburgh. Section B, booth 131. Nonpareil insulating brick for furnaces, ovens, boiler settings. Nonpareil high pressure covering and blocks for steam lines, heaters, boilers, breechings, ovens and other high-temperature equipment. Nonpareil cork covering for refrigerating drinking water lines, brine and ammonia lines. Nonpareil corkboard for roof insulation, cold storage and constant temperature rooms, tanks, etc. Linotile and Armstrong's cork tile floors. In attendance: F. W. Robinson, H. B. Gates, W. D. Thompson and C. A. Senter.

E. C. ATKINS & CO., INC., Indianapolis. Section B, booth 112. A No. 3 Atkins metal-cutting bandsaw machine; Atkins Kwik-Kut machines; circular Metal-cutting saws; Atkins AAA hacksaw blades; wood-cutting saws, and Cantol belt wax. In attendance: Edward S. Norvell, manager metal-cutting department; J. I. Kipp, salesman; R. P. Smith, salesman, and W. R. Chapin, metallurgist.

ATLAS STEEL CORPORATION, Dunkirk, N. Y. Section B, booth 168. Hot rolled and cold drawn tool steel and special alloy steel products. Forged high-speed products. Sample tools, and dies with records of performance. In attendance: H. J. West, W. H. Wills, F. B. Lounesberry and C. P. Burgess.

AVEY DRILLING MACHINE CO., Cincinnati. Section C, booth 221. A two-spindle No. ½ Avey drilling machine with tapping attachment. A one-spindle No. 1 Avey drilling machine, full automatic feed. A two-spindle No. 2 Avey drilling machine, full automatic feed and with tapping unit. A two-spindle No. 3 Avey drilling machine with power feed. A No. 2 Avey tool room drilling machine. All motor driven. In attendance: J. G. Hey, J. F. Mirrielees and L. H. Pratt.



Pier, Showing Location of Exhibitors' Booths

B

BAKER BROTHERS, INC., Toledo, Ohio. Section C, booth 221. A No. 121 quick-change type light heavy-duty drilling and boring machine, capacity ⅝ to 1½ in., arranged for motor drive with compound table. A No. 24 cam feed automatic drilling machine, which is a production machine with a maximum capacity of 1½ in. high-speed drills in steel. In attendance: W. W. Elliott, H. L. Tigges and William Baker.

BANNER ROCK PRODUCTS CO., Alexandria, Ind. Section B, booth 146. Rockwool and Rock Cork in jacket, blanket and block form. These products run from 86 to 95 per cent air void. In attendance: Corydon H. Hall, treasurer.

BARBER-COLMAN CO., Rockford, Ill. Section C, booths 201 and 202. Barber-Colman gear hobbing machines; Barber-Colman hob sharpening machines; Barber-Colman milling cutters and hobs; John Universal vise chuck and reversing tapping chuck; Barber-Colman working tying machine and Barber-Colman hand knotters. The last two items are a part of this company's complete line of automatic textile machinery, which it exhibits in connection with its machine tools as examples of work produced in its shops. In attendance: F. G. Hoffman, sales manager; C. M. Cheadle, Jr., and E. F. Linderoth.

JOHN BATH & CO., INC., Worcester, Mass. Section A, booth 37. Bath high-speed steel ground thread taps—standard and special. Bath high-speed steel thread rolling dies. Bath high-speed steel ground thread mills. Bath high-speed steel ground gear hobs. Bath high-speed steel ground plug thread gages. All of the above are ground from the solid. Bath internal micrometer and Bath internal thread micrometer, which measure holes to tenths of thousandths. In attendance: John Bath, J. Chester Bath and Robert E. Lamb.

BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. Section A, booth 45. Complete line of metallurgical microscopes and metallographic apparatus, including a new automatic feed arc lamp. A new series of optical systems by means of which the area of flatness of the image may be increased. Contour measuring projector, by means of which the contours of finished products may be checked and inspected. In attendance: I. L. Nixon, W. L. Patterson and E. H. Anthes.

BAY STATE TAP & DIE CO., Mansfield, Mass. Section B, booth 175. Complete line of taps, dies, drills, die stocks, tap wrenches and screw plates. Anderson dial tapper demonstrating the company's new spiral fluted production tap in actual operation; also a drill press, demonstrating Bay State drills. In attendance: Fred W. Day.

BELLIS HEAT TREATING CO., New Haven, Conn. Section A, booth 6. Bellis Lavite furnaces; also Carbon Lavite; tempering Lavite and high-speed Lavite. In attendance: A. E. Bellis, president; J. W. Black, superintendent; G. W. Webster, metallurgist; J. M. Dunlevy, sales manager; G. C. Davis, New England representative; C. G. Kennedy, Western representative, and R. C. Jordan, Philadelphia representative.

BETHLEHEM STEEL CO., Bethlehem, Pa. Section A, booths 36 and 47. Samples of raw materials, sections of ingots, etc. This exhibit emphasizes the fact that this company has the facilities for the exclusive production of those materials requiring the greatest care and skill in manufacture. In attendance: C. E. Chamberlin, R. E. Belknap, R. B. Wallace, John F. Lennon, A. P. Spooner, Henry Wysor, W. R. Shimer, G. C. Lilly, H. C. Biggs, Walter Trumbauer, R. H. Christ and G. A. Richardson.

BLANCHARD MACHINE CO., Cambridge, Mass. Section C, booth 221. Blanchard automatic surface grinder, No. 16-A, in operation on production work. Blanchard high power surface grinder, No. 16. Blanchard demagnetizer. Samples and photographs of work being done by users of all sizes of surface grinding machines. In attendance: F. E. Bartley and H. F. Skillings.

BRISTOL CO., Waterbury, Conn. Section B, booths 99 and 100. Bristol Fuller temperature control valves; Bristol temperature controlling instruments. Bristol multiple and single record pyrometers and indicating pyrometers. In attendance: H. L. Griggs, R. M. Walker, H. W. Moss, F. J. Reynolds, E. R. Wyatt and H. C. Clark.

BROWN INSTRUMENT CO., Philadelphia. Section B, booth 132. Exhibiting: Indicating pyrometers with single and double scales, equipped with automatic cold junction compensating devices, and in aluminum cases especially designed for protection against dirt. Portable pyrometer. Precision potentiometer graduated 0-50 millivolts incorporating the unusual 96-in. scale capable of being read to 0.01 millivolts. Automatic control indicating pyrometer for automatically controlling gas or oil fired furnaces or electrically heated furnaces. Medium high resistance indicating pyrometer. Indicating control thermometer for closely controlling temperature of quenching baths, etc. Single record continuous chart recording pyrometer. Other heat-recording equipment. In attendance: R. P. Brown, president; George W. Keller, sales manager; J. D. Andrews, New York district manager; George P. Beck, New England district representative; C. L. Simon, technical director of advertising; G. G. Goodman, George J. Egbert, New York representatives; W. S. Koop, sales promotion department.

BROWN LYNCH SCOTT CO., Monmouth, Ill. Section B, booth 128. Carbonizing compound cleaner and grader. In attendance: J. A. Scott and J. D. Tracey.

BROWN & SHARPE MFG. CO., Providence, R. I. Section C, booths 218 and 219. Automatic milling machine, grinding machine and automatic screw machine. In attendance: A. E. Mandeville and O. G. Swinburne.

BUREAU OF STANDARDS, Washington. Section B, booth 176. Equipment available at the Bureau of Standards for research and testing and which illustrates the fields of cooperation with various industries. Special attention to metallurgical work and in particular that relating to irons and steels, but the work of the paper, textile, rubber, leather, cement, optical glass and other sections also illustrated. Researches considered of special interest to members of the society and their guests illustrated by small models or photographs and transparencies. These include properties of metals at various temperatures, the study of quenching media for heat treatment, etc. Sets of publications for examination by those interested, and, in continuous operation, a projection lantern for complete demonstration of the field of activities of the bureau. In attendance: Dr. G. K. Burgess, director; H. W. Gillett, H. J. French, T. G. Digges and O. Z. Klopsch.

C

CALORIZING CO., Pittsburgh. Section A, booths 21 and 23. Heat enduring material consisting of Calorized steel annealing box, Calorized pressed steel lead pot, Calite alloy carbonizing box, section of Calite furnace skid rail, Calite I-beam. Sectional view of the company's Calorized metallic recuperator. Small furnace and recuperator under heat. In attendance: J. A. Wilson, sales engineer; A. V. Farr, vice-president; William M.

Smith, sales engineer, and George M. Davis, district manager.

A. C. CAMPBELL CO., INC., Bridgeport, Conn. Section C, booth 237. A No. 1 Campbell nibbling machine, cutting $\frac{1}{4}$-in. steel plates. A No. 1-B Campbell nibbling machine, cutting 3/16-in. steel plates (large). A No. 2 Campbell nibbling machine, cutting $\frac{5}{16}$-in. steel plates. In attendance: Stuart Naramore and others.

CARBORUNDUM CO., Perth Amboy, N. J. Section A, booth 14. Heat treating furnace of new design. Standard Carbofrax, Refrax, Aloxite and Magnesite high temperature fire brick; high temperature fireclay cement; high temperature carborundum cements. Carbofax pyrometer protection tubes. Carbofrax hearths, muffles, supports, etc., for heat treating furnaces. Display board of small Carborundum and Aloxite abrasive wheels. In attendance: J. C. Rice, J. A. King, C. E. Hawke and S. A. Fenno.

CARPENTER STEEL CO., Reading, Pa. Section B, booth 150. Souvenirs of products manufactured. In attendance: G. H. Edmonds, Reading office; F. A. Bigelow, president; J. H. Parker, vice-president; C. A. Heil, district sales manager; C. W. Olsen, district sales manager; J. M. Millard, sales representative; J. A. Phillips, Jr., sales representative; B. H. DeLong, metallurgical engineer; G. B. Luerssen and W. H. Kemper, metallurgical department.

CASE HARDENING SERVICE CO., Cleveland. Section A, booth 29. Bohnite—the compound made by the process of impregnating the energizer inside the compound. Caseite—a cyanide process. Non-Case—a paint applied to surfaces not to be carbonized, which prevents carburization of those surfaces. Hi-Tempo—heat resisting metal. Cleancoat, Bathite, Drawite and a complete line of case hardening materials. In attendance: W. C. Bell, E. J. Gossett and J. S. Ayling.

CELITE PRODUCTS CO., Chicago. Section A, booth 11. Sil-O-Cel insulating brick and powder for furnaces, boilers, etc.; Sil-O-Cel C-3 concrete for lining furnace doors and for insulating furnace spaces. Fraxite high temperature cement for laying and facing fire brick. Gas blow torch demonstration on Sil-O-Cel brick showing non-conducting properties, as well as small electric furnace with one-half of top fire brick, other half Sil-O-Cel brick, showing difference in heat transmission. In attendance: E. A. Phoenix, Chicago, and E. J. Weaver, Boston.

CENTRAL STEEL CO., Massillon, Ohio. Section B, booths 126 and 128. Photographs of plant operations. Parts made of alloy steels. Assembled transmission (in operation). Hot tops from ingots; display of gears and die blocks. F. P. Griffiths, president and general manager; J. M. Schlendorf, vice-president in charge of sales; B. F. Fairless, vice-president in charge of operations; from sales department: W. M. Garrigues, assistant general manager of sales; D. B. Carson, assistant sales manager; T. B. Davies, Syracuse district sales manager; A. Schaeffer, Detroit district sales manager; Frank Wallace, Philadelphia district sales manager; G. W. Wagstaff, Chicago district sales manager; F. L. Gibbons, Cleveland district sales manager, and C. C. Willits, New York district sales manager; from metallurgical department: E. C. Smith, chief metallurgical engineer; C. P. Richter, assistant chief metallurgical engineer; W. W. Leffler, M. J. R. Morris and R. K. Bowden, metallurgical engineers; from operating department: W. M. Lindsay, chief mill metallurgical engineer, and H. M. Cox, chief inspector sheet division.

CINCINNATI-BICKFORD TOOL CO., Cincinnati. Section C, booth 221. A 21-in. direct drive, movable head, upright drill, equipped with round table, power feed, tapping attachment, chip pan cutting lubricant outfit, geared motor drive. A 21-in. sliding head, upright drill, equipped with round tilting table, power feed, tapping attachment, chip pan cutting lubricant outfit, geared motor drive. A 3-ft., 24-speed, plain radial drill, equipped with plain table, cutting lubricant outfit, motor and speed box drive. In attendance: S. K. Wallace, L. D. Quackenbush, William F. McCarthy, H. A. Prentiss, D. F. Shaw, J. F. McCarthy and E. D. Crockett.

CINCINNATI MILLING MACHINE CO., Cincinnati. Section C, booth 221. A No. 4 plain, high power milling machine of the new type arranged for chain motor drive. A No. 2-M Universal, rigged up for a typical tool room job. A new 8-in. plain grinder operating on a production job; also a centerless grinder in operation. In attendance: R. L. Morrissey, J. H. Peckham, A. C. Hoefinghoff and W. W. Tangeman.

CINCINNATI PLANER CO., Cincinnati. Section C, booth 221. A 36 x 36 x 8 in. Hypro planer. In attendance: Carl Linden and George Langen.

CLEVELAND TWIST DRILL CO., Cleveland. Section C, booth 246. Two drill presses demonstrating Cle-Forge high-speed drills. In attendance: H. O. Swan, Fred Hoelzle, Tom Skove, W. C. Weidig, F. A. Kelly and H. P. Jenson.

COCHRAN-BLY CO., Rochester, N. Y. Section C, booth 237. Metal sawing machine and automatic saw sharpening machine. In attendance: W. H. Welch and S. M. Crandall.

COLONIAL STEEL CO., Pittsburgh. Section A, booth 43. High-speed and carbon tool steel for machine shop and metal-cutting tools. Hollow and solid bars for mining and rock drilling purposes. Carbon tool steel bars for blacksmith and foundry use, hammers, chisels, wedges, etc. Tool steel bars for machine parts. Tool steel sheets and circles for saws and knives. Bars and billets for manufacture of oil well drilling tools. Forging billets. Steel plates to be manufactured into plows, cultivators and harvesting machinery. Blocks and forgings for drop forging dies and trimmer knives. In attendance: J. Trautman, Jr., N. B. Hoffman, E. P. Fitzgerald, James F. Mitchell, Arthur C. Muller, Alan F. Harden, P. S. Crooker and W. H. McDonald.

CONSOLIDATED GAS CO., Boston. Section A, booths 2 and 3. Various appliances for the use of gas for industrial purposes. In attendance: J. C. D. Clark, industrial sales manager.

COOPER-HEWITT CO., Hoboken, N. J. Section C, booth 203. Cooper-Hewitt Work-Light, a means of illumination for all types of machine tool plants. The lamp consists of an auxiliary and a 50-in. tube of luminous vapor which emits a well diffused and practically monochromatic light, 90 per cent of which is in the green band of the spectrum. In attendance: C. F. Streibig, general sales manager; R. D. Mailey, factory manager and chief engineer; J. E. Watkins, district sales manager, D. R. Grandy, commercial engineer; E. C. Donegan, advertising manager; A. S. Hubbard and A. H. Kuehne.

CRESCENT WASHING MACHINE CO., New Rochelle, N. Y. Section C, booth 218. Metal cleaning machines. In attendance: O. P. Gellert, advertising manager and others.

CRUCIBLE STEEL CO. OF AMERICA, New York. Section A, booths 39, 40 and 41. Crucible tool and alloy steels, and special specification steels, and products manufactured from them. In attendance: E. C. Collins, president; Dr. John A. Mathews, vice-president; A. T. Galbraith, general manager of sales; J. W. Taylor; C. M. Johnson; A. E. Van Cleve; R. Michener, general sales agent and New England representatives.

D

DAVISON GAS BURNER & WELDING CO., Pittsburgh. Section A, booth 8. A special small oil burner using from ½ to 1 gal. of oil per hour with a special feed pump; also an oil pumping outfit—temperature control. In attendance: N. C. Davison, M. E. Kuhn and Edward Poor.

DEARBORN CHEMICAL CO., Chicago. Section A, booth 61. No-Ox-Id—a rust preventive. In attendance: E. M. Converse, director department of specialties; W. H. Fairlamb, Chicago; C. I. Loudenback, Detroit; P. H. Hogan, Boston, and Arthur Stuart, Boston.

HENRY DISSTON & SONS, INC., Philadelphia. Section B, booth 122. Milling saw, band saw and display boards showing slitting saws, milling saws, hack saw blades, files, etc. In attendance: Joseph L. Dorrington and Edward P. Ludy.

DONNER STEEL CO., INC., Buffalo. Section B, booth 117. Steel and steel products. Booth will also be used for reception purposes. In attendance: W. F. Vosmer, vice-president.

DRIVER-HARRIS CO., Harrison, N. J. Section A, booth 59. Castings and carburizing containers and furnace parts made and sold under the company's trade mark "Nichrome." In attendance: G. A. Lennox, New England manager; J. B. Shelby, Harrison office; W. B. Blythe, manager Detroit office; H. D. McKinney, manager, Chicago office; Arlington Bensel, first vice-president and general sales manager; G. A. Rickert, advertising manager, and H. O. Hartdegan, Canadian representative.

DYCAST STEEL CO., Collinsville, Conn. Section C, booth 210. Tool steel castings and bars; high-speed steel punches and dies—hot work; blanking dies and punches—cold cutting; special alloy cold striking dies cast to form; high-speed steel cast cutting tools. Composite high-speed tools cast to form on a soft steel back. In attendance: Arthur C. Davidson, manager, and others.

E

EATON ELECTRIC FURNACE CO., Taunton, Mass. Section B, booth 125. A No. 1 model "J" Eaton electric tool

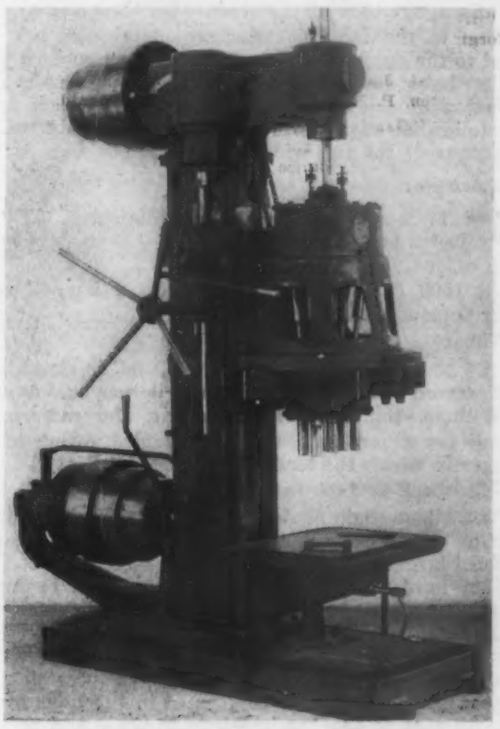
(*Continued on page 671*)

High-Speed Multiple Drill

Employment of the least number of parts from the main drive pulley to the drill spindle is a feature of the high-speed multiple drilling machine illustrated, which is being marketed by the Fox Machine Co., Jackson, Mich. The machine is known as the No. 22, type A.

The table regularly provided is of the adjustable knee type, as shown, the top having a planed surface, 18 in. x 24 in. Box tables or rotary tables may be provided.

An Edgemont single disk clutch is mounted inside the main drive pulley, which with the lower cone pulley



The Small Number of Parts for Transmitting Power from Main Drive Pulley to the Drill Spindles Is a Feature

runs on Hyatt roller bearings. The upper cone pulley is mounted on a shaft which is equipped with three self-alining ball bearings and carries a bevel pinion, meshing with bevel gear of vertical drive shaft. The bevel gear runs in ball bearings and the lower bearing of vertical drive shaft, in the head, is on a ball bearing. This construction is intended to minimize the friction of machine when under load. The upper cone-pulley shaft carries three gears for changing the feed, a three-step cone gear on auxiliary shaft being brought in mesh by the lever shown on side of the transmission case on top of the column. A soft steel worm and bronze worm gear transmit the power to the vertical shaft connected to the drill head. The feed clutch on the drill head is the Fox standard saw tooth type equipped with automatic knockout.

The transmission case on the column is partly filled with oil, so that lubrication of the parts is by means of the splash system. A forced feed pump on column sends oil to the gear box, from which the oil runs down the vertical drive shaft to head, the shaft being inclosed in telescoping sleeves. The oil then runs through the bearing of the pinions and then to a lower chamber, from which it is returned to the storage tank on side of column. The special patented construction is employed to prevent oil running out of the head down on the spindles.

The long bearing of the saddle on the column is a feature. Heads with either single or variable speed drive may be provided, the variable speed drive being claimed to be of unusual strength. The universal joint employed is a feature, this member having but three parts, two solid forks and one solid square center block. These joints are driven by a key instead of a taper pin, and may be removed quickly. When the machines are used on straight production work, the company's patented cluster plates are recommended.

The general dimensions of the machine include the following: head travel, 24 in.; head drilling area, 12 x 18 in. rectangular, 16 in. round, and distance from center of head to face of column, 14 in. The height to the top of gear box is 99 in. and the maximum height to top of drive shaft is 120 in. The floor space occupied is 44 x 74 in. The weight of the machine is 5150 lb. net.

Revision in Trunk Line Territory Freight Rates in Progress

The Trunk Line Freight Association, embracing railroads serving the territory east of Cleveland, Youngstown and Pittsburgh, is working out a revision of class freight rates based upon the Disque principle. This principle worked out by William A. Disque, attorney-examiner for the Interstate Commerce Commission, which has been in effect in the rate schedules in Central Freight Association territory for some time, calls the first class schedule 100 per cent and other classes are figured from that base. Thus, the second class schedule rates are 85 per cent of the first class rates, third class 66 2/3 per cent, fourth class 64 per cent, fifth class 50 per cent and sixth class 40 per cent. Application of such a plan would mean a restoration of the pre-war alinement of rates out of Pittsburgh, Youngstown and Cleveland as compared with those from Buffalo and other Eastern points. Pittsburgh would benefit by the proposed changes and it is probable that the plan will be strongly contested by traffic and trade representatives of some of the other points, which would lose some ground as a result of the proposed rate structure.

Machine Tool Market of India

There has been a decided expansion in the market for machine tools in India since the World War, occasioned largely by development and extension in industrial enterprises, according to a report from Trade Commissioner J. E. Miller, Calcutta. There is little doubt that this trade will increase with the industrial development of the country. The share of the United States in the machine tool market of India was $2,404,384 in 1922. In that year India was the leading purchaser of American metal-working machinery. This amount declined to $717,757 in 1923.

There has been some competition from Indian manufactured machine tools, especially in small lathes and drilling machines, but this does not seriously affect imports of the larger and more important types. Many American makes are copied by the Japanese, but their workmanship and finish are not comparable with the American. Both American and Japanese manufacturers have gained a firm position in the Indian market.

Much modern American equipment may be found among the factories and mills recently erected, being well designed for the purposes intended and growing in popularity. In some shops about half of the large tools are American, including lathes, drills, shapers, cutters, and in some cases special tools.

Although the Jones & Laughlin Steel Corporation, Pittsburgh, has denied any immediate intention of constructing a plant on its property at Hammond, Ind., dredging work is being pushed on the ship canal leading into the site, and for that reason hope has revived that the possibilities for the construction of the plant are, after all, not entirely remote.

The Pennsylvania Engineering Works, Inc., New Castle, Pa., is advancing production, and during the past month to six weeks has added about 100 men to the working force.

JOINTS IN SILENT CHAIN *

Renewable Split Bushings Have Widened Field of Use and Lengthened Life

Certain inadequacies of the early forms of power transmission caused the inventor to think of silent chain. This type of power transmission was designed originally for drives where neither belts nor gears were practicable. However, it has completely outgrown this usage and is today adopted for all manner of drives.

Silent chain was developed to combine the advantages of both leather belts and gears. In principle, silent chain is a toothed metal belt, designed to mesh with sprocket wheels having teeth cut to a contour proportioned to function with the chain links. The links are perforated and blanked from accurately rolled steel flats. The purpose of this perforation is to provide for a pintle on which the steel leaves will be assembled to a width desirable for the transmission of specific horsepower. Link shapes have varied during the progression of design, covering a period of over 20

The Type of Link Originally Employed With Plain Pins Permitted Elongation of Link Holes, Reduction in Pin Diameter and Consequently Short Life to Chain With Destroyed Pitch Accuracy

years, the present prevailing contour of link being shown in illustrations.

The most desirable requisite of a silent chain is the minimizing of stretch. This is controlled principally by the type of pin. And the principal weakness of the original, English type of silent chain was the liability of the pin to cut and the holes of the links to enlarge.

Modern Type of Link Employs Segmental Bushings as Well as a Pin

Where metal engages with metal there is bound to be wear, and in the case of a slender link engaging with a pin, quite obviously the element of wear due to operation resulted in not only decreasing the pin diameter but in enlarging the diameter of the link hole. This tendency is illustrated in the photographic reproduction of the old and now obsolete type of link.

It will be noticed from this illustration, too, that the enlargement of the perforated hole tends in the direction of pull. Thus, although the pitch, or center distance of adjacent joints, would be of a definite dimension when unworn, the wear tended toward ever increasing the distance between adjacent joints, resulting in greater pitch. Not alone did this wear make for greater pitch and ultimate stretch of the chain but it rendered repair almost impossible. New pins would not entirely take up this wear, and by reason of the elliptical form of the worn perforation, oversize pins could not be used. This tendency, to quite an extent, was reduced through the use of high carbon steel links and through case hardening both links and pins, but these proved only partial remedies.

It was not until James M. Dodge invented the bushed silent chain that this medium for power transmission achieved general success and universal application. By the use of segmental bushings each set of opposing links is given a bearing extending across the full width of the chain. With both pin and bushings hardened and the avenues of lubrication opened up by the peculiar construction of the joint, a satisfactory chain was evolved.

Not only did the development and adoption of the split bushings eliminate wear on the link holes and put the strain and wear of operation on the pin and bushings, but it made repair comparatively easy and highly practicable. In the employment of the segmental bushings the holes in the links are shaped to key the bushings in place. This prevents rotation due to the action of the pin at the periods of engagement and disengagement of the chain with the sprockets.

Due to the fact that the segmental bushings are equal to the chain width, the force exerted on each joint is distributed over the entire width. This results in a reduction of the unit bearing pressure in each joint. The following example more completely illustrates the advantage of the full width segmental bushing:

Example:

1-in. pitch and 4-in. width—pin diameter, 0.250 in.

Projected bearing area each joint, 0.25 in. × 4 in. = 1 sq. in.

At 1000 ft. per min. chain speed, a 1-in. × 4-in. chain transmits 22.5 hp.

Thus:

22.5 × 33000 ÷ 1000 = 742.5 lb. pull in chain load.

Force on joint is therefore 742.5 lb. per sq. in.

Without the full width bushing the number of pounds per square inch would be doubled, owing to the manner in which the load is distributed. Result:

742.5 × 2 = 1485 lb. per sq. in.

In a silent chain equipped with segmental bushings, such as the Link-Belt silent chain, the joint wear is confined largely to the contacting surfaces, between the circular hardened pin and the hardened split bushings. Thus when wear occurs the original pitch and efficiency of the entire chain is easily restored by the replacement of the worn members with new pins and bushings of standard size. And this repair is made possible only because the shaped holes perforated in the links are in such form as to key the bushings in place and prevent rotative action. It is also entirely practical, as experience has proved, to make such repairs several times, if necessary, before the ultimate life of the chain has been reached.

*From a monograph by Charles R. Weiss, chief engineer, Ewart Plant, Link-Belt Co., Indianapolis.

Australian Iron and Steel Imports from United States

WASHINGTON, Sept. 9.—While the United States is supplying almost 25 per cent of Australia's total needs of foreign merchandise, according to figures compiled by the Australian customs department, covering the first quarter of the present year, the percentage of imports from the United States of iron and steel, including automobiles and machines and machinery, is much higher. Of the total imports of iron and steel and automobiles, amounting to £8,122,348 for the first quarter, those from the United States were valued at £3,099,562, against £3,928,378 imported from the United Kingdom. Of machine and machinery imports valued at £3,311,346, those from the United States were valued at £1,324,027, against £1,695,314 imported from the United Kingdom.

Rolling Mill Awards

The Mesta Machine Co., Pittsburgh, will furnish a 36-in. blooming mill together with manipulator, tables, etc., for the Homestead works, Carnegie Steel Co. The Morgan Construction Co., Worcester, Mass., the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and the Mackintosh-Hemphill Co., Pittsburgh, have divided an order for three 18-14-in. structural mills for the Bethlehem Steel Co., one for installation at Lackawanna works and the others for Cambria Works, Johnstown, Pa.

Partly Killed Simple Steels—II

Settling and Rising Low-Carbon and Medium Steels—Steel for Structural Uses and for Rails

BY HENRY D. HIBBARD*

[*In the first installment the author compares partly killed simple steels with killed and with effervescing steels.*]

Imperfectly Effervescing Rising Steel

Imperfectly effervescing rising steel is made and put into structural steel, fence wire, nails and similar uses. It is not made deliberately from choice as being the most suitable, but is made as merely continuing some practice which has been found to give marketable products and which therefore does not necessitate change. Full effervescing steel is to be preferred.

At one American Bessemer steel plant (acid, of course), the low-carbon steel regularly effervesced inadequately and rose in the molds after teeming. This was due to turning the vessel down too soon so that the metal was blown "young." It needed two or three seconds' more blowing to give a stronger effervescence in the molds which would have checked the rising tendency. The steel rose in the 3-ton molds 3 or 4 in. and then rimmed in. It was infested with skin holes with the usual results.

At the same works the basic open-hearth low-carbon steels also rose in the molds because of too gentle effervescence following a too gentle boil in the furnace, as described elsewhere. Both Bessemer and open-hearth steels at this plant were chiefly put into fence wire and nails.

Steel for Structural Uses

At another steel works, which makes low-carbon open-hearth steel for structural beams, channels and angles, the regular practice is to make imperfectly effervescing steel in which the escape of gas in the molds, though rather free, is inadequate to prevent skin holes except in the top third of each ingot. The result is that the steel rises considerably in the molds and the lower two-thirds of each ingot is badly infested with skin holes. This honeycomb structure of the ingot causes the lower part, where the skin holes are, to cool quicker than the top, which can be plainly seen when the ingots are red hot and cooling in the open.

As the steel maker said, speaking of this difference in surface temperature and particularly of the line of demarkation between the hotter top and cooler bottom, "the blow holes go in there."

He accepted that as normal and proper but it was not. Had he been called upon to make steel for plates or sheets, none of his steel would have been marketable, but for his trade, where the great stresses in the material as parts of steel structures are longitudinal, his material was accepted, though not so good as it could be made, even for that.

The chief cause of his skin holes and rising steel probably was insufficient amount of ore added to the bath. As a consequence the boil of the charge in the furnace was not brisk enough and the effervescence in the molds too gentle. Perhaps his metal, before the final additions were made, also contained too much residual manganese or over 0.10 per cent, which would also tend to check the boil in the furnace and effervescence in the mold. The other common cause of rising low-carbon steel—too high casting temperature—probably did not often contribute to make the steel rise at the works.

Standing Low-Carbon Steels

These steels are made at some works to be rolled into plates. They are killed enough so as not to rise in the molds. The method followed in making them is to work the metal in the furnace down to a moderate boil and then to add at the end enough of the gas solvents, such as silicon (about 0.05 per cent in the ladle) and aluminum (about 0.02 per cent in the mold), to prevent any great escape of gas. The steel then lies quietly in the mold without rising, but the upper part of the ingot will contain numerous gas holes and a considerable though diminished pipe cavity.

These steels always require to be hot-worked more than once to give merchantable goods, that is, first slabbed and then rolled into plates, as do rising imperfectly killed steels already referred to and for the same reasons. Full effervescing steels are also standing steels inasmuch as they neither rise nor settle. They are quite different, however, from the standing steels just referred to. No gas solvent is added to them at the end as a rule, though it may be to check the effervescence in the molds if it is too strong. They contain some gas holes but they are deep-seated and harmless when the steel is given adequate hot-working. There is no pipe. The collective volume of the gas holes is equal to that of the potential pipe which would form were the steel to be killed, or about 4 per cent of the volume of the ingot.

Settling Low-Carbon Steels

Settling low-carbon steels are like standing low-carbon steels and are similarly made except that the gases are kept in solution as completely as practicable. To that end more silicon (about 0.08 to 0.10 per cent) and aluminum (about 12 to 15 oz. per ton) are added at the end with the usual addition of manganese to give the finished steel 0.50 or 0.60 per cent. These additions kill the steel except as noted below, there being practically no gas holes in the interior of the ingot. The pipe is large—fully 4 per cent of the volume of the ingot—but it is usually irregular in shape, not like the onion shaped pipe in medium and hard steels. It does not run down to a point as do pipe in high-carbon killed steels.

Settling low-carbon steels would be fully killed and so outside the limits of our subject, were it not that they are liable to contain a few shallow skin holes scattered at random in the skin of the ingot, and are therefore to be classed as partly killed. Such steel is sometimes made to be rolled into sheets for drawing and other purposes requiring soft steel of high quality, and these skin holes are liable to appear as blisters on the surface when the sheet is pickled in acid to clean it of scale.

Attempts have been made to prevent the formation of these skin holes by coating the mold inside with aluminum with the idea of overwhelming the gases in the skin metal by the gas solvent and so keeping them in solution. The better way to make such sheet is to make the steel fully effervescing, when there will be a solid skin on the ingot 2 or 3 in. thick which will contain no gas holes. Sheets made of such steel will be practically free from blisters when pickled.

Rising Medium Steels

Rising medium steels are sometimes, but not as a rule, made intentionally but medium steels sometimes rise because of too much gas in the metal for the gas solvents present to cope with. Such an excess of gas may be due either to (1) slow melting because of which an undue amount of iron is oxidized, or (2) to too free additions of ore to the bath, especially near the

*Consulting Metallurgist, Plainfield, N. J.

end, or (3) to insufficient amounts of gas solvents in the metal.

As a rule, in making such steel, nothing but a moderate amount of ferromanganese, or enough to give 0.70 per cent of manganese in the finished steel, is added at the end. The ferromanganese contains of course some silicon, which is a gas solvent, and the manganese also has some slight solvent power for the gases in the metal, but nevertheless they freely escape.

As medium steel is never intended to effervesce, the less gas it contains while molten before tapping and the fewer and smaller gas holes it contains when solid, the better. Medium steel which rises is always more unsound than that which stands and much more so than that which is killed enough to settle.

In this steel all three kinds of gas holes, skin, intermediate, and central, are usually present but are not so clearly distinguishable from each other as in effervescing steel. Skin holes, however, if present, are easily found and recognized as in low-carbon steels already noted. The first rising of the steel immediately after teeming is caused by skin holes but rising may continue through later solidification by formation of central holes. Segregation is usually more strongly marked in this than in more nearly killed steels. The non-ferrous and non-metallic impurities, both liquid and gaseous, tend to collect in the upper central part of the ingot to the impairment of its quality.

It is claimed by some that medium steel, which evolves gases in the mold, is benefited thereby even though the steel rises somewhat and the slowly escaping gases throw up miniature volcanoes on the ingot top as the last of the steel in the ingot solidifies. If there is a benefit, it is in the lower part of the ingot at the expense of the upper. The lower half or two-thirds of such an ingot may be fairly solid and free from gas holes and behave well enough in the blooming mill. Then, if the discard is great enough to take away all of the spongy top, the remaining steel may be marketable. Such steel is, however, not to be recommended.

Steel for Projectiles

At one American plant, engaged during the war in making steel for the manufacture of projectiles for one of the allied powers, the steel, which was made in the basic open-hearth and contained about 0.55 per cent of carbon, rose regularly in the molds. The ingots were all infested with skin holes, many of which were burnt into in the heating furnace and formed seams in the blooms. Most if not all of the ingots also developed cracks when rolled in the blooming mill. As seams and cracks were not permissible in the steel they had to be removed and an army of men with dozens of air-driven chisels were employed in cutting them out with great expenditure of time, trouble and money. Even then the steel could hardly have been satisfactory.

The amount of chipping on some of the blooms was so great that practically the whole surface metal of a side would be cut away. On others cracks or seams extending the whole length of the bloom were cut out. Most of the blooms had numerous relatively small seams of which the visible ones were cut out.

This steel was not properly made. It should have been made dead enough not to have any skin holes, in which case chipping would have been almost wholly avoided. The metal should have been worked out in the furnace to a gentle boil to rid it of undue amounts of oxides and gases and then, by the addition of suitable quantities of gas solvents, silicon and aluminum, in the furnace or ladle or molds, should have been nearly killed or made to settle as does settling medium steel noted later. It should have had no skin holes.

Standing Medium Steels

Standing medium steel does not rise or settle in the mold. After an ingot has been teemed, the top surface remains motionless and quickly freezes over. There is no escape of gas. As freezing proceeds, however, there is a separation of gases within, which have been dissolved in the metal, and the upper third of the ingot contains a great number of internal gas holes whose collective volume is nearly or quite equal to that of the potential pipe or about 4 per cent.

There is usually, if not always, an outer zone of skin holes and within a profusion of central holes. The lower half or two-thirds of the ingot may be sound. This steel may roll fairly well but the skin holes in the upper part are liable to form defects in the product, for example, when they are burnt into in the heating furnace and coated inside with oxide of iron or scale. They will then form seams or pits in the manner already described, which cannot be permitted if the steel must have a clean, sound surface. If the metal in hot-working is stretched laterally, as in some pressing and forging operations, any seams so formed are opened and the steel is therefore defective.

This steel, which is solid below and has skin holes above, indicates that the gas forming those holes (hydrogen probably) is kept in solution by a pressure of 5 or 6 lb per sq. in. plus the solvent power of 0.10 per cent of silicon.

Sonims in Standing Medium Steel

Standing medium steel is often, if not always, infested with sonims (solid non-metallic impurities) chiefly because such steels are commonly made in a hurry. The sonims are, as a rule, more plentiful in the upper central part of the ingot where many are caught and held in their progress upward from the lower parts of the ingot. The sonims are chiefly the products of the reactions between elements in the final additions and oxides in the unfinished steel.

Time and mixing are needed for the reactions to take place and the sonims to form and then coalesce. Then further time and quiet should be allowed before teeming for them to float out of the metal to the top and so leave it. In making this steel these precautions are usually omitted.

Standing medium steels are made intentionally and are defended by their makers as proper on the ground that they have a minimum, or at least, a diminished pipe. Metallurgically this defense is not valid but commercially it serves, in a way, particularly when the steel is cast into ingots with the larger end down. The pipe is then shorter and does not extend so far down into the ingot as it would if the steel were to be killed. In such a mold the pipe extends deeper for a given steel than if the larger end were up.

Steel for Rails

Much of the rail steel made in the past, in the acid Bessemer as well as in the basic open-hearth, has been standing medium steel. The C, D and E rails, made from the lower part of the ingot, may have been quite sound and homogeneous and also fairly free from segregation while the A and B rails, particularly the former made from the upper part, retain much of the unsound character of the ingot and are prone to flow and sliver in use. Such steels have usually about 0.10 per cent of silicon added at the end, usually in the ladle, which almost wholly prevents the escape of gas during solidification but still permits the formation of gas holes within the ingot as noted.

It is sometimes customary, in making standing as well as settling medium steel in the open-hearth, to add a part at least of the gas solvent (silicon) in the furnace while the boil is too active, which indicates a too plentiful supply of oxygen in the slag and metal. As a result the gases are not wholly kept in solution and the sonims are more plentiful than if the metal had been more completely deoxidized in the furnace by the action of the carbon before the addition of silicon.

Settling Medium Steels

Medium steels which are only partly killed and yet settle are much like those that stand, except that they are likely to contain no skin holes and to have a pronounced pipe, not so large indeed as that which forms in perfectly killed steel but one which when cast small end up may extend nearly half the length of the ingot and call for nearly as great discard, if all the piped part is to be rejected.

These steels are made for rails by makers who aim to avoid gas holes almost wholly or as much as seems to them to be advisable. To this end they add from 0.12 to 0.15 per cent of silicon which is enough, if the

unfinished metal is not overcharged with oxides, to limit the formation of gas holes to a comparatively few and generally only central holes. Each ingot will, however, have a large pipe. If there is a tendency of the metal to contain skin holes, due perhaps to some peculiarity in method, it may be corrected by the addition in the mold of a little aluminum, say about 0.02 per cent or 6 oz. per ton, or perhaps less.

Hard Partly Killed Steels

These steels resemble medium steels in many respects, the differences being generally speaking in degree rather than in kind. They may have all varieties of gas holes and may pipe to any extent according as they are more or less completely killed Most high-carbon steels now made are, or should be, killed.

Rising and Standing Hard Steels

These are rarely made now as they would be unsuitable for any purpose for which hard steel is required.

Standing hard steels are made for springs, hammers and similar purposes. The methods employed in making them are much like those employed in making standing medium steels, though the more rapid elimination of carbon requires that ore be added more cautiously to allow proper control of that element in the finished steel. Ingots of this steel contain central holes in their upper parts which give a sort of laminated structure in the finished bar rolled from steel which contains them. Such a structure is looked upon favorably by some users, as in leaf springs for vehicles. The contention is that such steel is less brittle than if homogeneous.

Settling Hard Steels

These steels are nearly killed and are made for files, tools, etc., which really should be made of killed steel. They contain no skin holes and the few gas holes they do contain are located at random in the interior of the ingot, but more plentifully in the upper central part near the pipe which is always present unless prevented by the well-known casting methods.

Conclusions

Partly killed steels are almost wholly made on a tonnage basis with the least practicable amount of time given to a charge which will yield a saleable product. It may be easier to make the specification meet the steel than to make steel meet specifications which can be filled only by high-quality material. There are, nevertheless, suitable methods for making steel to fill any proper specification.

In view of the endless variety of steel-making methods, there may be steels which do not admit of being classified as herein set forth. It is hardly possible for anyone to be informed as to all the different steels which are, or could be, made. The "off" grades or qualities outnumber many times the good.

Steel-making methods can never be completely standardized. Differences in materials including ores, fuels, melting stock, refractories and fluxes, as well as differences in climate will ever prevent that, even though the plants were to be uniform and makers all to have the same aim. Each venture must to a certain extent work out its own salvation. No practice can be adopted from one plant and worked in toto at some other. As specifications are raised and testing and inspecting become more and more general, greater care must be taken to have steel which meets the requirements. Partly killed steels will, therefore, as time goes on, be made less and less and may become eventually of the things which "were but are not."

Every steel-maker should know what his steels are by cutting up from time to time ingots made by the various methods he employs and particularly those suspected of being unusual in any way.

93,000 CARS BOUGHT IN 1924

Total Ordered in 1923 Was 95,595, but 145,083 Were Delivered

Inclusive of the 10,000 cars just purchased by the Pennsylvania Railroad, as announced elsewhere in this issue, the total of freight cars bought so far this year for railroad service is 92,796, according to carefully compiled estimates.

This compares very favorably with the 1923 record of 95,595 cars ordered, but 1923 was the banner year since the war in the number of cars delivered to the railroads by car-building shops, the total being 145,083, many of these having been contracted for in the latter part of 1922.

The most active year for car builders in more than a decade was 1913, when 172,729 cars were completed and delivered to the railroads. The 1923 record comes next, and no other year since 1913 has approached these totals.

Despite the fact that during the recent falling off in business acivity the railroads had a great deal of idle equipment, it is stated by car builders that the carriers are still far behind in their car-building programs. Their total purchases since 1918 have been considerably less than the number of cars retired through obsolescence, and it is expected that a revival of business, with the natural increase in car loadings, will bring about another car-buying movement.

With approximately 2,500,000 freight cars in the country, the number retired each year is about 75,000, and it is expected that these requirements will increase until in 1930 they shall have reached about 100,000 a year. It is also estimated that the railroads should increase the number of cars about 5 per cent a year to take care of the normal growth of the country's traffic. This means that about 125,000 cars should be built each year, aside from the replacement of retired equipment, to keep pace with transportation requirements. That the railroads since the war have been able to get along with less than the estimated required number of cars is attributed to the fact that the periods of unusual business activity since 1918 have been of comparatively short duration, enabling them during periods of depression to put their existing equipment back in shape.

Exclusive of the car shops of the railroads, the car-building capacity of the United States is about 350,000 cars a year. Except for a part of 1922 and 1923 the car shops have not been working at full capacity in the post-war years.

It is noteworthy that in 1923 and 1924 the late winter months were the months of greatest buying. This year February was the record month, with orders for 39,708 cars, while in 1923 March was the big month, with orders for 36,558.

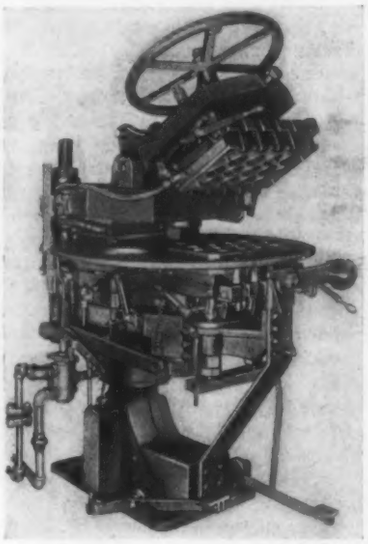
Manufacture of stoves and appliances burning gas and oil is reported by the Census Bureau to have amounted in 1923 to $112,289,797. Returns were from 240 establishments, employing 16,789 wage earners (on the average). The amount of wages was $22,437,753, or an average of $1,337 per wage earner. The horsepower installed was 22,570 and coal consumed 94,783 net tons.

The Muncie Products Co., Muncie, Ind., a subsidiary of the General Motors Corporation, is increasing production and adding to the working force; more than 200 additional men have been given employment during the past few weeks. The present quota is about 1200 operatives.

Machine for Molding Plastic Materials

A recent addition to equipment available for the manufacture of parts from plastic materials is the automatic universal plastic molding machine illustrated herewith, which is known as the Duo-Press and is being marketed by the Automatic Molding Press Co., 280 Passaic Street, Newark, N. J.

The machine is adapted for the manufacture of many parts used in the radio, telegraph and telephone, in electrical instruments, automobiles and aeroplanes and in other products. It was invented by G. H. Davis, president of the company, and is claimed to be sufficiently flexible to permit of any combination and degree



Automatic Universal Plastic Molding Machine. Complex molds or those having three or more separable parts may be employed

of heating, cooling, pressing and time units, making it adaptable to rapid production. Complex forms of molds or those having three or more separable parts may be used in the machine.

The component parts of the machine include a powerful main press; a sub-press for preheating and prepressing; a mold-gripping and separating press; and a tilting-head mold exposing mechanism. There are also four chambered jackets which are adaptable to various combinations of heating and cooling; means for moving the lower mold plate and substituting ejector pins; and an automatic ball-bearing conveyor. The machine is said to function without operating steam valves and at 25 lb. less steam pressure than usual.

The press is designed to permit the separating, loading and unloading of one set of molds while a second set is under final pressure and curing, which permits of increased output. Another feature emphasized is that because time is not lost in separating, unloading, cleaning, reloading and lifting the molds in and out of the press, the main press, of 127 tons capacity, is kept in constant pressing action.

The automatically operated turntable of the machine transposes simultaneously the two mold units, eliminating laborious manual conveying of the molds from one press or place to another. Because of its straight pull, damage to the molds resulting from separating the parts at an angle, is said to be eliminated. Another feature emphasized is that the new machine eliminates the danger of injury to the hands of the operator, which danger is usually present in the machines that necessitate putting the hands between the movable platens. Because of the features enumerated it is claimed that the output of the machine is greatly increased.

The hydraulic power exerted by the main press of No. 2 standard machine is 127 tons, and by the No. 2 special 156 tons. The maximum sub-press pressure, for pre-forming, is 25 tons, and the retraction, for separating mold parts is 94½ tons, maximum. The ram of the standard machine is 9 in. in diameter and has a movement of ½ to 6 in. The turntable is 42 in. in diameter and is provided with two large mold apertures. The size of the two molds or chases is 11 x 19 in. Each of the two chases accommodates mold impressions for 2 8-in. dials, 8 4-in. dials, 13 3-in. dials, 26 2-in. dials, 60 1 5/16-in. dials or one box 8½ x 16 in., with a depth up to 7 in.

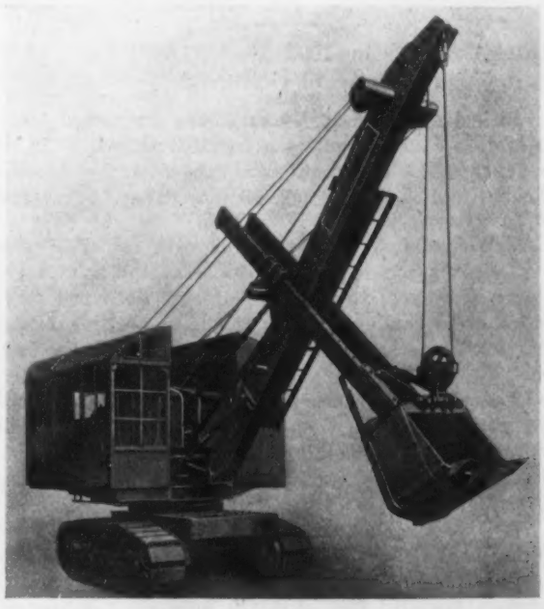
A batch of completed articles is delivered at every half revolution of the turntable, which occurs about every 3 min. where bakelite is used, and the articles average 1¼ in. in thickness.

Brazilian Low-Grade Manganese Ores

WASHINGTON, Sept. 9.—In order to permit the exportation of low grade manganese of less than 44 per cent the Brazilian Government has given the product a low valuation for the collection of the export tax, under stipulated conditions, says a report received by the Department of Commerce from Consul General A. Gaulin, Rio de Janeiro. Transportation difficulties have attended the exploitation of manganese, but mining is being continued. Manganese is not being consumed in Brazil to any appreciable extent, the report says, but as it is a raw product which cannot be reproduced and as demand is likely to be renewed, a geologist has been appointed to estimate the reserves in the state of Minas Geraes so as to decide the proper amount to be kept for domestic consumption.

Excavator Has All-Steel Cab

The Pawling & Harnischfeger Co., Milwaukee, is now equipping its ½ yd. and ¾ yd. capacity excavators with a specially designed all-steel cab, which in addition to neatness of appearance, assures protection of the main machinery against inclement weather and tampering. The cab is provided with windows on each side of the operator so that he may be fully protected from the cold or dampness and efficiently operate the machine at the same time. A swinging steel door is placed at each side of the machine to give complete access to all parts of the machinery. The windows are



Steel Cab with Windows Protects Operator

protected by sheet steel covers which may be slipped into place when the machine is not being used. A rolled sheet cover is placed over the drums and gears with a narrow slot for the cables to lead through.

The model 206 has new, increased capacity ratings in accordance with increased dipper capacity. After tests of operation in the field, new ratings are now given for the various boom lengths. These ratings show for 10-ft. radius a capacity of 22,000 lb. and for 35 ft., say, 4100 lb.

Power Bending Machine

Designed to cover a wide range of work, and yet light enough to be transportable from one job to another, a new bending machine, model No. 8, has been placed on the market by the Wallace Supplies Mfg. Co., 1310 Diversey Parkway, Chicago. The machine, which weighs about 8000 lb., is intended for bending pipes, tubes, conduits, reinforcement bars, angles, channels, tees and special sections, and may be used either right hand or left hand so far as bars are concerned.

In the illustrations the machine is shown equipped with a form for making a 90-deg. bend in pipe 4 in. in diameter. More than 90 deg. can be obtained either by resetting the material in the form or by subjecting it to repeated operations. A special form may be had for larger degrees of bend. Forms can be furnished to make bends to any number of degrees and to any radius from a maximum of 4 in. radius in small pipe—1¼ in.—to a maximum of 24 in. radius in pipe as large as 4 in. This maximum may be increased to 36 in. by altering the patterns.

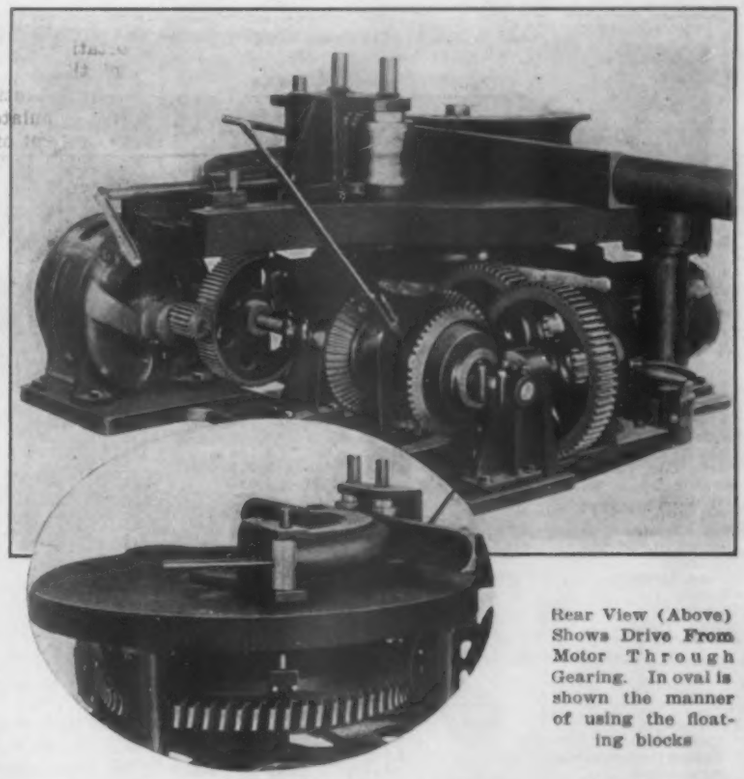
As the form is secured to the head of the machine it becomes a rotating member when the machine operates. One end of the material to be bent is clamped to the form by the use of an eccentric lever bearing against a floating block shaped to fit the material being bent. This makes it easy to slip the material out after the bend is made. To make a reverse or S-shape bend the fulcrum pin with knurled top, which secures the eccentric to the clamp, is taken out to permit removal of the finished S-bend.

Interposed between form and back-pressure rollers is a floating follower bar to support pipe walls at the point of bending, and thus prevent flattening them by direct pressure of the rollers against the pipe wall. This follower bar is grooved to fit the pipe. The back-pressure rollers are held in position by pins with extended knurled ends; this permits their easy removal for changing over to another type of roller for special jobs. The back-pressure rollers are mounted on a movable bracket in a tapered extension slide which has a total movement of 24 in. by means of a screw. Quick motion is provided by fitting the adjusting screw nut with two pins, which may be put into any pair of a series of holes, so that the entire screw mechanism can be shifted quickly.

Automatic stopping of the machine to correspond with the degrees of bend required is obtained by means of a movable special block held in position by two set screws. This knocks out the clutch mechanism, being set at any predetermined point on the flanging of the large worm gear.

For bending pipes 2½ in. diameter and under the machine is operated directly through the large worm gear. For larger sizes, however, the work should be done through the back gears, at a slower rate. Under the direct drive through the worm gear the head revolves at 4½ r.p.m., this being reduced through the back gears to 1¼ r.p.m.

Floor area required is about 6 x 6½ ft. The height of machine from floor to top of table is about 26 in. and 36 in. over all. Thorough lubrication is provided for all important bearings, the worm and worm gear being inclosed to permit of running in gear grease.



Rear View (Above) Shows Drive From Motor Through Gearing. In oval is shown the manner of using the floating blocks

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About 80 per cent of the 300 operatives at the plant of the Benedict Mfg. Co., Syracuse, N. Y., manufacturer of plated ware, etc., have subscribed to an employees' participating second preferred stock issue of the company in an amount of $50,000, carrying dividends at the rate of 6 per cent.

Changes in Canadian Tariff

As a result of an Order-in-Council several changes have been made in the Canadian Customs Tariff, with the following items placed on the free list:

Rolling mill rods, of chilled iron or alloy steel, not further manufactured than the parts that are turned for testing purposes only, with or without machined wabbler attached, when imported by proprietors of rolling mills for use only in producing finished rolls for rolling iron or steel.

Iron or steel scrap, wrought, being waste or refuse, and iron or steel rails which have been in actual use, to be remanufactured in furnaces, and such iron or steel rails.

Copper bars when imported for use only in the manufacture of rods to be used exclusively in the manufacture of electrical conductors, the individual unit of which shall not exceed in area No. 7/0 gage conductor.

Copper rods when imported by manufacturers for use in their own factories in the manufacture of electrical conductors, the individual unit of such electrical conductor not to exceed the area of 7/0 gage conductor.

The following items used as materials in Canadian manufactures shall be subject to reduced duties, viz.:

Rolled iron and steel sheets and strips, hardened and tempered, or ground, not further manufactured than cut to shape, without indented edges, when imported by manufacturers of saws for use exclusively in the manufacture of such saws in their own factories.

Under the British preferential tariff, 7½ per cent ad valorem; under the intermediate tariff, 12½ per cent and under the general tariff, 12½ per cent ad valorem.

Automobile Production in United States

Figures gathered by the National Automobile Chamber of Commerce, New York, show a production of cars and trucks in August of 268,477, a gain of about 2 per cent on the 262,876 of July and of more than 9 per cent on the 245,790 of June, the lowest figure since January of last year. The August figure compares with 345,303 in August, 1923. The total for the first eight months of the year was 2,529,481, a drop of 175,060 (6½ per cent) from the 2,704,541 produced in the first eight months of 1923.

Motor manufacturers are stated to believe that the gain in automobile production is a reflection of generally improved industrial and farming conditions. Stocks in dealers' hands are well liquidated and present manufacture is based on orders from the field.

DISTRIBUTION OF STEEL EXPORTS

Analysis of Destination of Seven Principal Items of Outgoing Tonnage for July and for Seven Months

Supplementing the tables on pages 568 and 569 of the Sept. 4 issue of THE IRON AGE, the information in the tables herewith gives details as to the principal countries of destination of outgoing tonnages of plates, rails, black and galvanized sheets, barbed and galvanized wire and tin plate. The figures are for July, 1924 and 1923, and for the seven months ended July 31 in each of those years.

More than two-thirds of the plates exported in July went to Canada; other countries took small tonnages. Galvanized sheets were well distributed, no country taking more than 25 per cent; Japan was the largest customer, with Cuba, Canada, Philippines and Mexico following in that order. Japan and Canada between them took nearly 80 per cent of the black steel sheets, Japan alone taking about 46 per cent. Of steel rails Cuba took nearly half the total export tonnage. Canada and Brazil between them accounted for 60 per cent of the remainder. Brazil took almost half the total of barbed wire exported, the remainder being split into relatively small parcels; Mexico, Colombia, Cuba and British South Africa were the next largest customers, none taking as much as 8 per cent of the total. Galvanized wire was well distributed, Canada taking the largest tonnage, with Mexico second. In tin plate, Japan took 40 per cent of the total and Canada about 20 per cent. The rest went in much smaller tonnages to a wide range of customers. Plain structural shapes exported went mainly to Canada, which took 14,582 tons. Cuba took 1497 tons and Japan 359 tons.

Exports from United States by Countries of Destination

(In Gross Tons)

	Plates				Galvanized Sheets				Black Sheets			
	July		Seven Months Ended July		July		Seven Months Ended July		July		Seven Months Ended July	
	1923	1924	1923	1924	1923	1924	1923	1924	1923	1924	1923	1924
Canada	6,999	2,796	64,408	45,547	3,643	963	23,738	11,511	4,007	1,579	35,972	24,044
Argentina	*119	*126	*815	*786	429	176	3,346	3,935	275	159	1,639	910
Japan	25	....	451	183	279	1,929	2,620	10,007	2,368	2,228	18,827	58,595
Cuba	122	89	620	743	1,229	1,024	8,461	5,278	166	77	1,135	557
Philippine Islands	45	336	167	917	653	857	4,246	8,965	54	345	160	552
Mexico	87	81	464	469	560	845	3,837	3,182	....	....	....	....
Chile	....	....	....	....	43	38	1,486	744	....	....	....	....
Colombia	....	....	....	....	341	446	3,552	1,924	....	....	....	....
Central America	....	....	....	....	150	211	2,301	2,580	....	....	....	....

	Steel Rails				Barbed Wire				Galvanized Wire			
	July		Seven Months Ended July		July		Seven Months Ended July		July		Seven Months Ended July	
	1923	1924	1923	1924	1923	1924	1923	1924	1923	1924	1923	1924
Canada	6,776	2,852	27,159	13,224	25	50	4,416	599	954	732	9,299	5,978
Japan	3,961	....	44,781	30,369	....	....	....	....	1,864	18	13,467	3,770
Cuba	8,202	8,444	27,250	22,788	1,495	633	6,481	4,592	294	185	1,609	1,176
Chile	....	....	2,116	6,889	....	....	....	....	615	18	3,524	194
Brazil	....	2,616	804	8,146	1,011	4,557	6,303	17,464	1,282	105	5,589	3,418
Philippine Islands	382	405	2,625	2,910	....	....	....	....	....	....	....	....
Mexico	216	273	2,571	7,325	567	700	2,047	2,100	248	422	2,071	2,198
Colombia	861	1,140	2,109	6,021	630	650	3,068	3,903	....	....	....	....
Argentina	325	....	834	....	....	134	6,410	5,709	659	19	9,263	3,270
West Indies	....	....	....	....	....	....	6,153	....	....	....	....	....
British S. Africa	....	....	....	....	844	609	4,030	3,472	....	....	....	....
Australia	....	....	....	....	1,053	282	5,134	1,795	346	172	3,882	1,489
Great Britain	....	....	....	....	....	....	....	....	61	143	1,277	1,159
Chosen	....	....	2,151	36	....	....	....	....	....	....	....	....
Honduras	139	271	7,332	2,627	....	....	....	....	....	....	....	....
Kwan Tung	1,960	....	11,143	10,985	....	....	....	....	....	....	....	....

*All South America.

	July		Seven Months Ended July	
Tin Plate:	1923	1924	1923	1924
Canada	2,980	1,507	17,098	14,510
Japan	1,205	3,163	16,143	23,574
Argentina	933	646	3,085	6,467
Uruguay	483	45	1,956	290
China	1,873	131	5,797	22,934
British India	2,928	245	2,931	9,059
Chile	213	32	1,190	1,466
Cuba	769	261	3,197	3,158
Mexico	224	235	1,260	2,255
Hong Kong	683	45	1,944	6,151
Italy	....	451	2,264	3,695

Troy Foundry Co. Formed as Successor to Troy Foundry & Machine Co.

As part of the reorganization plan affecting the properties of the Troy Foundry & Machine Co. and submitted to a creditors' committee last June, the Troy Foundry Co., Inc., Troy, N. Y., has been formed as successor. The new company purchased the assets of the old on July 25, incorporating with 7000 shares of preferred stock at $50 par and 70,000 shares of common stock at a nominal par value of $1. The plants acquired are equipped to pour 75 tons per day. Gray iron castings will be made up to 7½ tons in weight. Alterations and additions to the present plants will be made which, according to President A. E. Hodgkins, will give the company a thoroughly modern factory.

Mr. Hodgkins has been connected with the iron ore industry for 30 years, during the last 20 of which he has been associated with the magnetite deposits in the Adirondacks. He was formerly manager of the Cheever Iron Ore Co. and for several years was comptroller of Witherbee, Sherman & Co., Port Henry, N. Y. H. P. Parrock, who will be vice-president and general manager, has had many years' experience in the iron and steel and non-ferrous industries, latterly having specialized in foundry practice in the Buffalo, Youngstown and Eastern districts. Operating department heads will be those who were with the old company for several years. The board of directors includes W. R. Alley of Alley & Page, New York; Harold T. Clement, treasurer Rogers-Brown Co., Buffalo, and J. W. Biggerstaff, foundry superintendent American Locomotive Co., Schenectady, N. Y.

Bulletins on courses in machine practice, forge work, foundry practice and pattern making have been issued by the Carnegie Institute of Technology, Schenley Park, Pittsburgh. The courses cover both day and night work.

Acid Bessemer Practice in Sweden

The Process Carried Out Without Final Additions—Converters Distinctly Unique—Heat Balance and Composition of the Iron and Steel

IN the first issue for 1924 of the famous Swedish iron and steel publication, *Jernkontorets Annaler*, there is a long paper entitled, "A Study of the Bessemer and Basic Bessemer Processes." The author is Rutger von Seth, an assistant in the department of metallurgy, Royal Institute of Technology, Stockholm, and represents work carried out by him in investigating the Swedish acid and basic Bessemer practice at various plants.

Swedish acid Bessemer practice has long been notable because Sweden is the only country in which it is carried out as conceived by Bessemer—that is, without any final additions. And it is interesting to see that von Seth's investigations were carried out with the help of money from the Göransson fund of the institute, because Göransson is credited with being the first man to make Bessemer steel in Europe. Below is given an abstract of the part relating to the acid practice, which covers tests made at two plants, designated A and B.

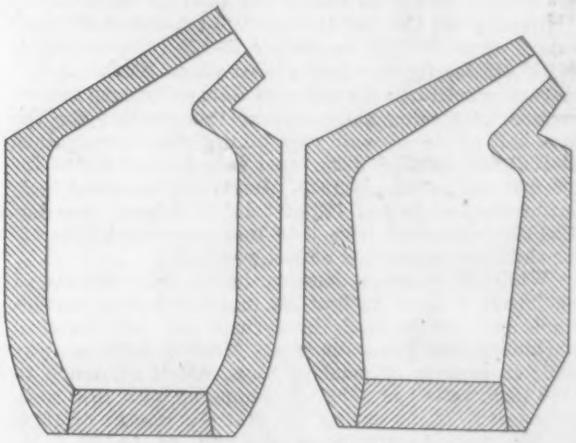


Fig. 1.—Bessemer Converter at Plant A (Left) With Bessemer Converter at Plant B (Right)

The types of converters appear strange to us and are shown in Fig. 1. Each plant had two acid-lined bottom blown vessels of the kind shown, for a charge of 4 to 5 tons. Direct metal is used, tapped from the blast furnace into a ladle and transferred to the converter. Further details regarding the converters are given in Table 1.

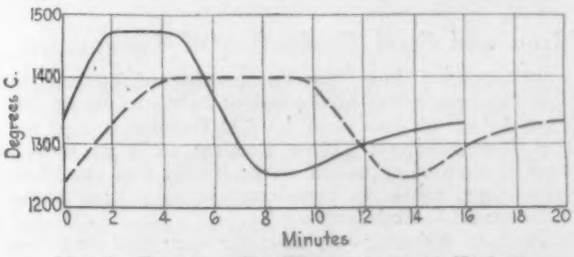


Fig. 2.—Bessemer Gas Temperatures at Various Periods

The various samples to determine the progress of reactions were taken by turning the vessels down each time. A water cooled copper pipe was used to obtain gas samples during blowing, mounted on a swinging arm. Ten to 15 sec. were required for each sample, and after taking over 200 samples the pipe was in good condition. Very interesting observations on gas temperatures were made on normal heats similar to the test heats by using a thermocouple with a protecting tube of graphite. These are shown in Fig. 2, the solid line being the case of a heat where the active carbon boil appeared five minutes after the start of blowing, and the dotted line representing a case of 10 min.

Special observations may be given for Heat A 60 which was the heat investigated most fully, although the total number of heats examined was six at plant A and three at plant B. The weight of pig iron for Heat A 60 was 5 metric tons, its temperature 1330 deg. C. The steel weighed 4.665 tons, and its temperature was 1520 deg. C. The loss was therefore 6.7 per cent. The blowing time was 16 min. 45 sec., and the time to the active carbon boil was 6 min. 30 sec. The practice was normal without additions. The composition of the charcoal pig iron was: Carbon 4.38, manganese 2.97, phosphorus 0.027, sulphur 0.005, silicon 1.24 per cent and that of the finished steel was: Carbon, 0.74, manganese 0.26, phosphorus 0.027, sulphur 0.005, and silicon 0.04 per cent. The progress of the blow is shown in Fig. 3, which also gives details of the slag composition. The predominance of MnO in the slag over FeO is most clearly brought out, as well as the fact that carbon is caught on the way down and that no final additions are made, as opposed to our practice. The very interesting results of the gas analyses are shown in Fig. 4, and the presence of hydrocarbons was not detected.

Table 1—Details of the Converters

	Plant A	Plant B
Calculated depth of bath in inches, 4 metric tons iron (2204.6 lb.)	16.75	19.3
Calculated depth of bath in inches, 5 tons iron	20.08	23.6
Cubic contents of converter, cu. ft.	148.3	97.1
Cubic contents per ton iron (4 tons)	37.1	24.3
Cubic contents per ton iron (5 tons)	29.7	19.4
Number of tuyeres	191	105
Length of tuyeres, in.	14.57	15.75
Diameter, at top, in.	0.35	0.47
Diameter, at bottom, in.	0.39	0.79

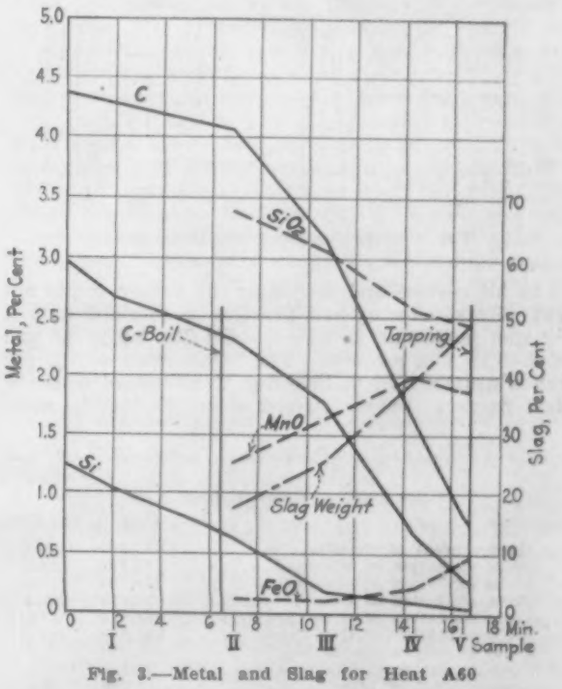


Fig. 3.—Metal and Slag for Heat A60

Based on the analyses shown in Figs. 3 and 4 and a

Table 3—Analyses of Pig Iron and Steel

Heat	Pig Iron C	Mn	P	S	Si	Time of Blow Min.	Sec.	Steel C	Mn	P	S	Si
A 60	4.38	2.97	0.027	0.005	1.24	16	45	0.74	0.26	0.027	0.005	0.04
A 58	4.52	3.50	0.026	0.004	1.20	14	15	0.69	0.27	0.026	0.005	0.03
A 46	4.42	3.41	0.022	0.005	1.37	20	10	0.63	0.25	0.024	0.005	0.03
A 43	4.38	3.02	0.024	0.005	1.21	21	40	0.69	0.23	0.025	0.006	0.03
A 39	4.51	3.05	0.020	0.008	1.15	18	50	0.98	0.25	0.022	0.008	0.03
A 34	4.38	3.36	0.022	0.006	1.28	20	30	0.89	0.24	0.023	0.006	0.02
B 613	4.07	3.23	0.025	0.007	1.80	27	15	1.08	0.19	0.028	0.007	0.034
B 468	4.15	3.87	0.029	0.009	1.69	17	00	0.69	0.24	0.031	0.009	0.05
B 541	4.15	3.68	0.027	0.007	1.88	30	10	0.81	0.20	0.029	0.008	0.039

great many assumptions the author works out the heat balance for Heat A 60 shown in Table 2.

In the original paper are given similar details for the eight other heats. Analyses of the pig iron and final steel are given in Table 3.

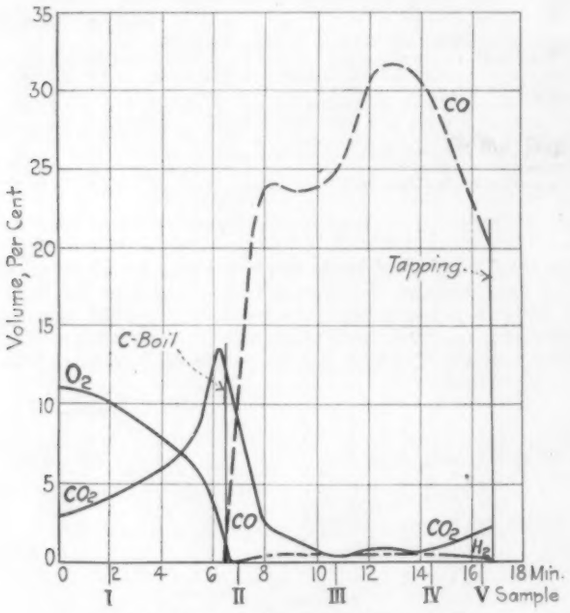


Fig. 4.—Gas Analyses for Heat A 60

In his résumé and discussion the author points out that normal blowing and practice is obtained with a pig iron containing C, 4.10 to 4.50; Mn, 3.0 to 3.5 and Si, 1.10 to 1.25 per cent. The temperature of the pig iron is usually 1320 to 1360 deg. C. as tapped from the blast furnace, and is lowered about 70 deg. C. while being carried to the converter. Final Swedish Bessemer steel has carbon seldom below 0.60; Mn, 0.20 to 0.25; Phos., 0.015 to 0.030; Sul., 0.004 to 0.010 and Si., 0.03 to 0.05 per cent.

G. B. W.

Table 2—Heat Balance, Heat A 60

	Cals.	Per Cent
Incoming:		
Heat content of pig iron	1,552,400	48.9
From oxidation of silicon	467,880	14.7
From oxidation of manganese	231,790	7.3
From oxidation of iron	38,170	1.2
From oxidation of C to CO_2	223,810	7.0
From oxidation of C to CO	390,920	12.3
From decomposition of Fe_3C	241,610	7.6
Heat of slag formation	23,140	0.7
Heat content of blast	9,690	0.3
	3,179,410	100.0
Outgoing:		
Heat content of steel	1,437,700	45.2
Heat content of slag	244,380	7.7
Heat content of gases	749,740	23.6
Heat content of spittings	7,500	0.2
For decomposition of H_2O	12,770	0.4
For decomposition of Mn_3C	11,180	0.4
Lost by conduction and radiation	716,140	22.5
	3,179,410	100.0

British Imports and Exports of Machinery for Six Months

WASHINGTON, Sept. 9.—In aggregate tonnage British imports of machinery during the first six months of 1924 recorded only a slight advance compared with the corresponding period of 1923, while the tonnage of British exports was 3246 tons lower than in 1923.

Imports for the first half of 1924 totaled 29,901 tons, valued at £5,134,320, as against 29,175 tons, valued at £4,843,418 for the first half of last year. Electrical machinery constituted the greatest item of import in both periods. Incoming shipments of this product for the first half of the present year totaled 2124 tons, valued at £532,695, against 2293 tons, valued at £553,543 for the first six months of 1923. Imports of machine tools during the first half of 1924 totaled 1503 tons, valued at £251,200, compared with 1860 tons, valued at £234,447 for the first six months of last year.

While there was a decrease in the total exports of machinery during the first six months of 1924, considerable gains were made in agricultural and electrical machinery and prime movers. Marked decrease was made in exports of machine tools, which amounted to 5405 tons, valued at £598,552, compared with 7010 tons, valued at £778,180 during the first six months of 1923. Textile machinery exports declined to 51,172 tons, valued at £5,380,765, against 77,007 tons, valued at £9,198,794. The British East Indies was the leading source of textile machinery exports, taking 16,891 tons, valued at £1,543,898 during the first six months of 1924, compared with 33,669 tons, valued at £3,531,696, during the corresponding period of 1923. Exports of textile machinery to the United States amounted to 3258 tons, valued at £380,596 during the first six months of 1924, against 3077 tons, valued at £474,402, during the first six months of last year. The gross total of British machinery exports during the first half of the present year was 219,509 tons, valued at £21,310,140, compared with 222,755 tons, valued at £24,022,809, during the first six months of 1923.

Iron and Steel Production of Luxemburg

LUXEMBURG, Aug. 26.—The number of Luxemburg blast furnaces active at the end of July was 36, as follows: Arbed: all 6 at Esch, all 6 at Dudelange, 2 of the 3 at Dommeldange; Terres Rouges: all 6 at Belval, those at Esch being out of work; Hadir: 8 of the 10 at Differdange, those at Rumelange being out of work; Rodange: all 5; Steinfort: all 3.

Production during July was: Pig iron: chill-cast iron, 7088 tons; basic iron, 173,540 tons; total, 180,628 tons. Steel: basic steel, 154,633 tons; open-hearth, 2229 tons; steel made by the electric furnace, 476 tons; total 157,338 tons.

Philippine Imports of Steel Products

WASHINGTON, Sept. 9.—Reaching their highest value of the year, imports of iron and steel products into the Philippine Islands in July amounted to 3,437,000 pesos. For the seven months ended with July they totaled 14,882,000 pesos, according to a cable received by the Department of Commerce from Acting Trade Commissioner Charles P. Goodhue, Manila. Iron and steel imports in July of last year amounted to 1,988,000 pesos.

Industry and National Defense Day Program

Preparedness as a Guarantee of Peace—Saving of Lives and Treasure a Paramount Motive—Volunteer Work Bears Fruit

CONTACTS, contracts and ability to manufacture are the three keynotes in connection with the industrial end of the celebration of National Defense Day. Contacts are essential so that the officers in charge may be acquainted with those upon whom reliance must be placed for materials. Contracts of the standard (flexible) form devised for this purpose are to be gone over in some detail, with the idea of getting new thoughts on the subject. Ability to produce, or rather a knowledge of what that ability is, is vitally essential in order that the multitudinous requirements may be matched up against this ability and all missing links chased down and ultimately eliminated.

All of these matters are to go into effect at the meeting at 3 p. m. Friday, Sept. 12, in the Engineering Societies Building, New York, on the birthday of General John Pershing, the sixth anniversary of the battle of St. Mihiel, and the sixth anniversary of the last draft registration which took place during the war. Similar programs will take place in the other districts, of which the total number is 14: Boston, Bridgeport, New York, Buffalo, Philadelphia, Baltimore, Birmingham, Pittsburgh, Cincinnati, Cleveland, Detroit, Chicago, St. Louis and San Francisco.

Saving in Cost by Advance Knowledge

Practically all the detail of this get-together program is being handled without cost to the Government by reserve officers located in the different districts. With some of them, the beginning was Sept. 5 and the end will be about Sept. 25. District officers, with officers of smaller divisions, are getting together, getting their fingers on the numerous lines of communication and arranging for permanent record, so that in case of any emergency it will be known what requirements there are for materials of all sorts and for office space, telephone service, and all the other multitudinous details of getting the nation mobilized.

Back of the whole idea are two thoughts: to have the nation less unprepared than we were in 1917 and to save money. Both work together. If by this means we find ability to produce materials quickly enough so that, for instance, only a three months' supply of a certain size of shell need be carried, there will be less money tied up in that particular item than if a six months' supply must be carried.

At the New York meeting, Elbert H. Gary, chairman United States Steel Corporation, will preside. General Robert L. Bullard will discuss the importance of industrial preparedness as a means for reducing armament in times of peace and of lowering casualties in times of war. Guy E. Tripp, chairman of the board, Westinghouse Electric & Mfg. Co., will respond on behalf of American industry.

Statements of Judge Gary and Mr. Tripp

In Judge Gary's discussion last week of the problem before industry, he said:

> With plans complete in every detail for the rapid production of ordnance and airplanes if and when needed, we can begin to talk of disarmament and safety in the same breath. In the present state of the world, we must either maintain big reserve stocks of war material at the taxpapers' expense or we must organize industry to produce ordnance and airplanes promptly when necessity arises. Complete disarmament may be impracticable, but a proper degree of industrial preparedness will permit taking great strides in that direction.
>
> The industrial effort we face in the event of invasion will require one out of every four wage earners in the metropolitan area to forsake his regular employment and to turn his hand to new and unfamiliar tasks in the manufacture and inspection of non-commercial implements of ordnance and aerial equipment. We have yet a fair nucleus of the ordnance knowledge salvaged from the World War and our first problem is to disseminate this knowledge effectively.

On that same occasion Mr. Tripp spoke as follows:

> War lays a heavy hand on industry. It consumes its equipment, disorganizes its personnel, disrupts established methods, nullifies fundamental policies, causes unhealthy and malignant expansions, exhausts the energies of management and in countless other ways injures and destroys. We cannot hope to eliminate completely these destructive effects of war. War is never welcomed by a nation like our own, but if it comes industry must bear its share of the burdens. But we can try to reduce these burdens to the lowest possible minimum, and if we succeed not only industry but the nation will gain greatly thereby.

Must Have the Arms

It was pointed out by Col. James L. Walsh, district chief, that Mr. Bryan's famous assertion that in case of invasion a million men would spring to arms over night is literally true except for the "arms" part of it. Unless we have the arms to which they can spring their springing will do no good. It is largely to learn to what extent these arms can quickly be provided in an emergency that the dress rehearsal, so to speak, is to be held. Colonel Walsh stated that the Army Ordnance Department has designed a 75-mm. gun with twice the range of the famous French "75," while the redesigned 155-mm. gun outranges the French gun of that size by nearly five miles. Our new 12-cm. gun outranges our pre-war design two and one-half times and throws a heavier projectile. These are technical points with which industry has to deal in its problem of preparedness.

Achieving Industrial Preparedness

At a dinner in New York on Feb. 5 last Colonel Walsh put the case aptly, as follows:

> This meeting tonight has nothing to do with going to war. What we are interested in is achieving a state of industrial preparedness which will match our unrivalled man-power with adequate munition-power, so that our country will be secure from attack by any power or combination of powers. We are planning for peace—continued peace—and we think we have hit on a logical way to insure it. Not by the mere expression of a pious wish, but by commanding it. And we of industry, in working for this end, are really working for ourselves, because upon us will fall the heaviest burden if we again are caught unprepared industrially as we were in 1917. A great many people think that our participation in the World War was profitable for industry, but I doubt if there is a single corporation in existence today that would not be better off if there had been no war, and if we had been permitted to continue in the paths of peace.

Manufacturers are being approached on this subject as rapidly as the small force at work can handle it. It is estimated that it will take about four years completely to cover the field, but each step is a step ahead and the progress is accumulative.

CONDITIONS IN EUROPE

Head of Import Firm Sees No Danger from German Competition

President Paul G. Leoni of the Iron & Ore Corporation of America, 11 Broadway, New York, importer of Continental pig iron and iron ores, who recently returned from a business trip to Europe, found a situation in the steel industry there which he regards as unpromising. To compare the situation now with that found at other of his frequent visits, Mr. Leoni's opinion, after two months' observation, is that he "never found conditions in Europe so unsatisfactory as this time." When asked about the prospects of German steel producers competing with makers here, he said he considers as loose talk the reports of Germany flooding world markets with cheap goods. Such reports, he believes, may be based on past performances but not on present conditions, with financial difficulties, high transportation rates and shaken confidence, further vexed by extortionate demands of labor.

Troubles in England

"In England," he said, "the steel industry is very poorly occupied and unemployment conditions are serious. The Labor Government is in a difficult position; on one side, it is obliged to do everything to restore peace in Europe; on the other, a great deal of pressure is exerted by labor organizations, which are afraid of German competition as soon as conditions are again normal.

"Especially the English coal industry, which has reaped a good harvest since the occupation of the Ruhr and was able to pay good wages, is afraid of a general slump in coal prices and a corresponding reduction in wages whenever the French leave the Ruhr. Belgian iron and steel producers are comparatively better off than their neighbors. Rails, billets and steel bars can be purchased today in Belgium cheaper than in England, and much cheaper than in Germany. In France, where conditions were temporarily bad when exchange was most unfavorable, business is improved but still is far below last year."

High Costs in Germany

Mr. Leoni's view of Germany's position is that it has "tremendous capacity for production," but he found business there "exceedingly bad." Costs of production make another setback and now, being based on gold marks, these costs "have become so high that many German products are far above world market prices."

"During the inflation, when money dropped 30 to 50 per cent in a day, the one recourse was to invest in tools, buildings or merchandise. The consequence is that today nearly all firms, even the largest, are short of cash. One large steel works, known the world over, has requested suppliers to cease shipment of materials, because it has no money with which to pay.

"I cannot see how this condition can soon improve, even under the Dawes report, except that the stringency of funds might be relieved. One of the chief reasons for high German costs of production is the extremely high railroad rates, which are bound to remain at the present status." It will be recalled that the railroads were offered as one of the main securities for the German loan.

Mr. Leoni has no doubt, however, that the Dawes plan will restore confidence in European trade, lack of which has been the great deterrent.

COMING MEETINGS

September

Association of Iron and Steel Electrical Engineers. Sept. 15 to 19. Annual convention at Pittsburgh. J. F. Kelly, 513 Empire Building, Pittsburgh, secretary.

American Society of Mechanical Engineers. Sept. 15 to 18. Machine tool exhibit, Mason Laboratory, Sheffield Scientific School, Yale University, New Haven, Conn. For catalog and tickets, address Prof. S. W. Dudley, 400 Temple Street, New Haven, Conn.

American Management Association. Sept. 19 and 20. A conference to discuss measurement of personnel activities. New Ocean House, Swampscott, Mass. W. A. Griffin, 20 Vesey Street, New York, chairman.

American Society for Steel Treating. Sept 22 to 26. Annual convention and exhibition. Headquarters, Copley-Plaza Hotel; exhibition, Commonwealth Pier, Boston. W. H. Eisenmann, 4600 Prospect Avenue, Cleveland, secretary.

American Mining Congress. Sept. 29 to Oct. 4. Annual convention, Sacramento, Cal. J. F. Callbraeth, 814 Munsey Building, Washington, secretary.

National Safety Council. Sept. 29 to Oct. 3. Annual safety congress, Brown Hotel and Hotel Seelbach, Louisville, Ky. W. H. Cameron, 168 North Michigan Avenue, Chicago, managing director.

October

American Electrochemical Society. Oct 2 to 4. Fall meeting and round-table discussions. Hotel Tuller, Detroit. Dr. Colin G. Fink, Columbia University, New York, secretary.

American Institute of Mining and Metallurgical Engineers. Oct. 13 to 15. Annual inspection trip and meeting, at Birmingham. Frederick F. Sharpless, 29 West Thirty-ninth Street, New York, secretary.

American Foundrymen's Association. Oct. 13 to 18. Annual convention, Milwaukee. C. E. Hoyt, 140 South Dearborn Street, Chicago, secretary.

American Gear Manufacturers Association. Oct. 16 to 18. Semi-annual fall meeting, Briarcliff Lodge, Briarcliff Manor, N. Y. T. W. Owen, 2443 Prospect Avenue, Cleveland, secretary.

Meeting of Steel Fabricators

The annual convention of the American Institute of Steel Construction will be held at the French Lick Springs Hotel, French Lick, Ind., Nov. 13, 14 and 15. All who are interested in the fabrication or use of structural steel are invited to be present as guests of the institute. Membership in the institute now contains more than 170 of the more prominent fabricators of structural steel in the United States and Canada.

Marked progress is reported in the execution of the four-year program adopted last year. Some 25 cities have adopted the institute's standard specifications as part of their building codes, among which are the following: Kansas City, Mo.; Providence, R. I.; Montclair, N. J.; St. Joseph, Mo.; Los Angeles, Detroit, Washington, Toledo, Ohio; Louisville, Ky.; Baltimore, Syracuse, N. Y.; Erie, Pa.; St. Paul, Cincinnati, Sarnia, Canada; Boston, Newark, N. J.; Flint, Mich.; Buffalo and New Orleans.

A standard code of practice, calculated to clear away much of the confusion that has existed in the past, has been prepared, ready for adoption. This code serves to establish all contracts on a basis equally fair to architect, engineer, owner and fabricator.

Better selling methods are to be encouraged in order that the advantages of structural steel may be intelligently presented and its use extended as a logical result of a better understanding. The publication of a sales manual to contain the necessary data is a part of the program of activity.

Charles F. Abbott, 350 Madison Avenue, New York, is executive director, and Lee H. Miller, 1052 Leader-News Building, Cleveland, is chief engineer.

A meeting of the gage steel committee, of which H. W. Bearce, Bureau of Standards, is secretary, will be held in Boston, at the Copley-Plaza Hotel, on Monday, Sept. 22, at 8 p. m. Service and laboratory wear tests will be reported on, and plans will be made for continuing the work of the committee.

CONCRETE BAR STANDARDS

Eleven Areas for Reinforcing Bars Adopted at Meeting of Makers and Users

WASHINGTON, Sept. 9.—Representing more than 80 per cent of the annual capacity of their product, manufacturers of reinforcing steel bars, together with large distributing interests, representatives of the Associated General Contractors of America and other consuming sources met today in the Division of Simplified Practice, Department of Commerce, and adopted as standards for reinforcing bars 11 sizes, based on the area of the bars, this action effective Jan. 1 for producers and on March 1 for distributors who have stocks or current orders to be cleared before completion of the plan, will replace some 40 or more sizes now in use.

The meeting was presided over by Edwin W. Ely of the division. Subsequent to the conference at the Department of Commerce, a meeting was held in the Hotel Hamilton, where informal discussion was given over to grades. The sentiment was in favor of adopting for use as uniform practice the intermediate grade, thus eliminating the other two grades, standard and hard bars.

The areas in square inches of the standards adopted were as follows: 0.049, 0.110, 0.196, 0.250, 0.307, 0.442, 0.602, 0.785, 1.000, 1.266 and 1.563.

In opening the discussion at the Division of Simplified Practice A. A. Lindau, representing the American Concrete Institute, Detroit, and the American System of Reinforcing, Chicago, outlined the pre-war experience as to sizes of reinforcing bars demanded. He showed how in a single plan 18 or 20 sizes were frequently called for, some with as little as 1/16 in. variation. The demand, he said, was curbed during the war, but had since backslid to nearly as great a variety as before. He declared that certain highway departments had standard plans which includes other than the suggested standard sizes and that a certain amount of hesitancy might be found before changes to the standards would be made.

E. F. Kelly, representing the American Association of State Highway Officials, and W. O. Irwin, representing the Truscon Steel Co., Youngstown, Ohio, discussed highway construction. Mr. Irwin disclosed that from the distributors' standpoint the present variety is tieing up huge sums of money in stocks and that the consumer had to pay the interest on the investment. Pacific Coast points, he said, call for a greater variety than the Central and Eastern parts of the country.

George E. Routh, Jr., Kalman Steel Co., Chicago, recommended that the area of the bars be considered for standardization rather than the shapes, a position which was indorsed by Richard L. Humphrey, Philadelphia, representing the committee on standard specifications for concrete, and the American Society for Testing Materials. In considering grades the statement was made that a committee of the American Society for Testing Materials had taken up the matter and the question was held in abeyance for action at the next annual conference on revisions of the simplification adopted today. Further information will be sought regarding this subject from the Association of American Steel Manufacturers.

To Standardize Manhole Frames

WASHINGTON, Sept. 9.—The Division of Simplified Practice, Department of Commerce, has received a large number of replies from associations of manufacturers, city engineers, public utilities and others in response to its suggestion to call a meeting this fall to develop simplification and standardization of manhole frames and covers for street use and is awaiting further answers before naming the date for the conference. Replies received are favorable to the plan as a means of eliminating waste in production as well as a greater convenience to foundrymen, engineers and purchasers. Among other suggestions made in replies is that the manhole frames and covers be made stronger through greater use of pig iron, and it is noted that some municipalities have adopted this course, which has been made necessary by greater stresses, such as those imposed by motor traffic. The importance of reducing costs by replacement also is pointed out by some of those making replies. The City of New York replied that the Borough of Manhattan has about 30,000 sewer manholes, 90 per cent or more of these taking covers of one size. About 1.5 per cent of the manhole covers are replaced each year on account of being broken or stolen. About the same number of worn manhole heads are replaced by new manhole frames and covers each year during repaving operations. The new frames and covers are of practically the same design as the old, except for increased strength in the cover. Public service companies own about 60,000 manhole heads in the Borough of Manhattan. In the Borough of Brooklyn, there are about 48,000 sewer manhole heads, and authorities are working toward the reduction of sizes and standards.

Ladder Added to Stacking Truck

Another convenience added to the field of material handling equipment has recently been put out by Lewis-Shepard Co., 606 East First Street, Boston 27, Mass. This is a ladder built integral with the company's "stacker." In the improved machine, it is now possible for the workman, after putting the load on the lifting platform and elevating it to desired position, to climb the ladder and push the load to the desired shelf or top of stack.

Attached Ladder Facilitates Unloading from Stacker

The appliance is built principally of structural steel in heights ranging from 6 ft. to 14 ft. in multiples of 6 in. and in five capacities from 500 lb. to 2000 lb. It may be provided with plate or roller platforms. Base wheels are equipped with roller bearings. While stacking trucks of this general design are not novel, it is claimed that the ladder effects a considerable saving in time and effort on the part of the workman.

European Iron and Steel Markets Dull

British Demand Fails to Materialize—Ferromanganese Under Fire—Continental Conditions Spotty but Makers Hopeful

(*By Cable*)

LONDON, ENGLAND, Sept. 9.

PIG iron is weak on the absence of a revival of demand. Stocks still are accumulating and makers are desperate for orders. Hematite is easier. Gjers, Mills & Co., Ltd., Middlesbrough, have blown out a second furnace and further curtailment on the part of other makers is anticipated. Tees shipments of pig iron in August were below 30,000 tons.

Scandinavian producers of ferromanganese still are accepting low prices—below £12 15s. ($56.61) c.i.f. United Kingdom having been done recently. English makers are booked heavily and now are adopting a firmer attitude.

Foreign ore is stagnant. Bilbao Rubio nominally is held at 22s. ($4.88) c.i.f. Tees.

Finished iron and steel is dull, with prices unchanged. There is some moderate inquiry, but business is doubtful, owing to the reluctance of makers to grant concessions. The Dudley plant (Woodside Ironworks) of Cochrane & Co., Ltd., has been purchased for dismantling. [Two blast furnaces, iron foundry, cast iron pipe plant.]

Sheets and Tin Plate

Tin plate bars have been advanced to £8 12s. 6d. ($38.30) per gross ton.

Tin plate minimum price has been increased 6d. basis to 23s. 6d. ($5.22) basis, IC, f.o.b. Bristol Channel. Fair quantities were sold before the rise at 23s. 3d. ($5.16) basis, f.o.b. merchants or consumers. Export demand is improving, except for the Continent. Wasters are dearer, 20 x 14's being sold up to 20s. 3d. ($4.50) basis, f.o.t.

Galvanized sheets are dull but firm. Makers are well placed.

Black sheets to Far Eastern specifications are strong. Makers have advanced the prices of Japan 6 x 3, 13's, 107 lb. They now are £19 (3.77c. per lb.). Other markets are quiet.

On the Continent of Europe

Continental markets are weak. Belgian merchant bars are obtainable at £5 17s. 6d. (1.16c. per lb.) f.o.b., with four weeks shipment. Belgian joists (beams) are being sold at £5 16s. 6d. (1.15c. per lb.) f.o.b. German plates are now done at £7 (1.39c. per lb.) f.o.b., though some makers are asking higher figures.

General business, however, is poor, and makers are clamoring for orders.

GERMAN SENTIMENT HOPEFUL

Iron and Steel Conditions Show Some Improvement—Too Many Locomotive Shops

BERLIN, GERMANY, Aug. 27.—A slight but distinct improvement in the steel and iron situation has taken place. That the improvement is no accident is shown by the fact that the textiles branch also recovered; and that both recoveries were chronicled immediately after the German-Ally agreement was concluded in London. Until then conditions were getting worse. The number of unemployed in unoccupied territory on Aug. 1 had risen to 338,000, against 210,000, the best record of 1924, on June 1. The new recovery is maintained despite the obstacles so far raised by the German National party to the passing of the necessary reparations bills by the Reichstag. It is beyond doubt that these obstacles will be overcome, even if a new Reichstag election has to take place. Meantime, the improvement in business, coming at the time it did, justifies the old expectation that a reparations settlement will start a new era of industrial activity.

So far the heavy metal improvement is confined to

British and Continental prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.44 per £1, as follows:

Durham coke, del'd	£1	6s.					$5.77		
Bilbao Rubio ore†	1	4					5.33		
Cleveland No. 1 fdy.	4	8					19.54		
Cleveland No. 3 fdy.	4	3					18.43		
Cleveland No. 4 fdy.	4	2					18.20		
Cleveland No. 4 forge	4	1					17.98		
Cleveland basic	4	2½					18.32		
East Coast mixed	4	11					20.09		
East Coast hematite	4	19	to £5	0s.			21.98	to	$22.20
(a) Ferromanganese	13	10	and 13	0*			59.94	and	57.72
Rails, 60 lb. and up	8	5	to 9	0			36.63	to	39.96
Billets	7	10	to 8	5			33.30	to	36.63
Sheet and tin plate bars, Welsh	8	12½					38.30		
Tin plates, base box	1	3½					5.22		
							C. per Lb.		
Ship plates	9	5	to 9	15			1.83	to	1.93
Boiler plates	13	0	to 13	10			2.58	to	2.68
Tees	9	7½	to 9	17½			1.86	to	1.96
Channels	8	12½	to 9	2½			1.71	to	1.81
Beams	8	7½	to 8	17½			1.66	to	1.76
Round bars, ¾ to 3 in.	9	12½	to 10	2½			1.91	to	2.01
Galv. sheets, 24 gage	18	5	to 18	10			3.62	to	3.67
Black sheets, 24 gage	13	0	to 13	5			2.58	to	2.63
Black sheets, Japanese specifications	15	5					3.02		
Steel hoops	10	15	and 12	10*			2.13	and	2.48*
Cold rolled steel strip, 20 gage	17	0					3.37		

*Export price.
†Ex-ship, Tees, nominal.
(a) Nominal.

Continental Prices, All F. O. B. Channel Ports

(*Nominal*)

Foundry pig iron:							
Belgium	£3	18s.	to £4	0s.	$17.32	to	$17.76
France	3	18	to 4	0	17.32	to	17.76
Luxemburg	3	18	to 4	0	17.32	to	17.76
Billets:							
Belgium	5	7½			23.87		
France	5	7½			23.87		
Merchant bars:					C. per Lb.		
Belgium	5	17½	to 6	5	1.16	to	1.24
Luxemburg	5	17½	to 6	5	1.16	to	1.24
France	5	17½	to 6	5	1.16	to	1.24
Joists (beams):							
Belgium	5	15	to 6	0	1.14	to	1.19
Luxemburg	5	15	to 6	0	1.14	to	1.19
France	5	15	to 6	0	1.14	to	1.19
Angles:							
Belgium	8	0	to 8	5	1.58	to	1.63
¼-in. plates:							
Belgium	7	0	to 7	10	1.39	to	1.49
Germany	7	0	to 7	10	1.39	to	1.49
⅜-in. plates:							
Luxemburg	7	0	to 7	10	1.39	to	1.49
Belgium	7	0	to 7	10	1.39	to	1.49

ingots, semi-finished material generally, wire rods and some kinds of sheets. For these there is a considerable demand. The home demand for scrap, most of which has of late been exported, also has increased, with rising prices, and this indicates a revival in the smelting branch. Steel and rolling mills report having orders for four or five weeks ahead, but this is at their present production rate, which is below normal. This week's prices, ex-works, are (in gold marks per metric ton):

			Per Gross Ton
Ingots	94	or	$22.75
Blooms	100 to 102	or	$24.20 to 24.68
Billets	105 to 107	or	25.41 to 25.89
Slabs	108 to 110	or	26.14 to 26.62
			Per Lb
Construction forms (beams)	114 to 117	or	1.23c. to 1.26c.
Bars	120	or	1.30c.
Thick sheets (5 mm. and over)	135	or	1.46c.
Medium sheets (3 mm. to 5 mm.)	145 to 150	or	1.57c. to 1.62c.
Thin sheets (1 mm. to 3 mm.)	160 to 165	or	1.73c. to 1.78c.
Thin sheets (under 1 mm.)	180	or	1.95c.

All these prices are approximate, not being controlled by any syndicate. Dealers are selling bars at as high as 160 gold marks (1.73c. per lb.). Export prices have been raised a little, bars selling at £6 5s. a metric ton. Belgian competitors quote £6 2s. 6d. to £6 5s. German export prices for thick sheets are £7 3s. to £7 5s.; medium sheets, £7 18s. to £8. In these sorts Germany is at present able to undersell Belgium; but Belgium is reported to be under-selling Germany in thin sheets.

The pig iron market is still dull. The recent reduction of 5 gold marks per ton conceded by the Roheisenverband has not had the expected effect of making the market more active. Ore supplies are plentiful. The recent inflow of Swedish ore was so great that the Dortmund-Ems canal was congested, and deliveries had to be made via Rotterdam. French minette also is being delivered in large quantities.

Machines and Tools

The small iron goods and tool industry is depressed. In the Hagen district 120 concerns are considering closing down. Here and in the Remscheid and Schmalkalden districts it is declared that production cost is above foreign; and that unless coal, iron and electric power are cheapened it will be permanently impossible to compete. The Solingen steel branch recently reported that the depression had touched bottom, and this week it reports a certain improvement. Home orders have increased and prices have risen slightly. After being reduced 10 per cent some weeks ago, prices of Solingen fine steel goods were estimated to be still 50 per cent higher than in 1913. Unemployed in the district at present number 4000. Export in the last few months was only about half that of before the war. Business with East Europe has increased, and there are hopes of considerable sales to Russia.

Home demand for machine tools is still very small, and shops are working at between 50 and 60 per cent of their full capacity. For twist drills only is there a considerable demand. The *Bergwerks-Zeitung* reports that in this branch the shops are concentrating on production of first-quality goods only. Through the recent commercial agreements with Austria and Spain, Germany will export machine tools to these two countries on the same terms as regards duties as are enjoyed by England, France and Italy. Considerable Spanish orders are expected. An agreement of the same tenor is being negotiated with Hungary.

In machinery generally prices have touched bottom. Producers complain of the special duties imposed on German machinery in a number of countries; and declare that they cannot compete with the United States. In mine machinery Belgian competition is felt.

Germany Has Too Many Locomotive Plants

Conditions in the locomotive branch have not changed. A small order for ten locomotives has been given by Lithuania. Although more abundant home orders may be expected as soon as the new railroad corporation sets to work, the permanent prospects of this branch are not promising. Before the war 60 to 70 per cent of locomotives built were used at home, and 30 to 40 per cent were exported. Some concerns exported up to 45 per cent of their output. The home state railroads took about 50 per cent of production, while about 20 per cent was bought by industry and by private railroads.

In the first post-war years the locomotive works were kept busy with orders for replacing worn-out material and material delivered to the Allies under the Armistice conditions, and the lack of an export market was not felt. During the war foreign markets were lost, and peace found the locomotive construction capacity of foreign countries enormously increased. Germany's present main difficulty is that foreign buyers, where there are any, nearly all want long credit, which her competitors can give more easily than she. This is particularly the case with South America.

No business is being done with Russia. The old Russian orders of 600 to 700 locomotives have been executed. A great many of these new locomotives now lie unused in Russian sheds because of bad condition of tracks and general run-down conditions. At present Germany has 21 locomotive-building concerns. Krupps, Rhenish Metal, the A. E. G., and other miscellaneous metal-working concerns have all turned to locomotive building; and it seems that production capacity is permanently too great for the prospective home and foreign demand.

Imports of Iron and Steel Exceed Exports

Foreign trade in June in heavy iron and steel of most kinds again showed import surpluses. Imports of iron and steel and wares except machinery were 148,917 metric tons; exports only 107,260 tons. But if scrap iron, of which exports exceeded imports tenfold, is omitted, the import balance is much greater. Pig iron imports were 30,642 tons, exports 3290 tons; bars, imports 69,463 tons, exports 11,460 tons; ingots, blooms, billets, etc., imports 6457 tons, exports 444 tons; wrought pipe, imports 3995 tons, exports 3691 tons; steel rails, ties, etc., imports 9858 tons, exports 1064 tons. Machinery imports were 1289 tons, exports 20,851 tons. In the whole first half of 1924 machinery imports were but 4095 tons, exports 122,482 tons.

A report embracing sixteen coal, lignite and iron ore districts, with 723,815 employees, shows that in 13 districts working hours for surface workers are now 10 instead of the former 8, and that in 15 districts hours of underground workers are 8 to 8½ hr., instead of the former 7. Only in the Saar coal district is the 7-hr. day now in force for underground miners.

An increase in the demand for farm machinery is predicted as a result of impending state measures to provide agriculturists with long-term credits on easy terms. The chief measure is the conversion of the Rentenbank, which is being displaced by the proposed Gold Note Bank, into a central Agricultural Credit Bank, with a capital of 2000 million gold marks. Farmers will profit also through being freed from the bond debts imposed on industry under the Dawes scheme, and further from the rise in grain prices which has taken place since the Government removed the export prohibition and introduced a bill restoring the pre-war import duties.

BELGIAN STEEL MARKET WEAK

Hopefulness Prevails, Based on Reparations Settlement—Present Business Scarce

ANTWERP, BELGIUM, Aug. 23.—Most prices are still weak and business scarce, both inland and for export. In general, quotations remain the same. Sterling prices for different articles, owing to the relative firmness of the money market, are generally reaching the "franc prices," as quoted now by Belgian makers. Presently makers can book as well in sterling as in francs.

In several commodities German competition remains strong. Steel bars during the last fortnight had an increase in price of 2s. 6d. to 3s. 9d. per ton.

The general feeling is that, although the near future seems less favorable, one may expect better prospects later on. Of course, it remains to be seen what will really be the results of the London arrangements; they

certainly may move the market. In fact, a much larger amount of business might be possible in our market if German makers, as it is generally expected, are going to obtain more orders in their own country.

Steel is quoted as follows:

	Fr.	
Bars, basis price	570 or	$28.50 (1.29c. per lb.)
Joists and U-iron	560 or	28.00 (1.27c. per lb.)
Rods	670 or	33.50 (1.52c. per lb.)
Corrugated bars	670 or	33.50 (1.52c. per lb.)
Wire rods	640 or	32.00 (1.45c. per lb.)
Hoops	800 or	40.00 (1.81c. per lb.)
Cold rolled steel hoops	1,200 or	60.00 (2.72c. per lb.)
Drawn steel: squares	1,200 or	60.00 (2.72c. per lb.)
rounds	1,150 or	57.50 (2.61c. per lb.)
hexagons	1,240 or	62.00 (2.81c. per lb.)
Rails	725 or	36.25 (1.64c. per lb.)
Spring steel, best quality	1,100 or	55.00 (2.50c. per lb.)

Especially for these materials has the market shown a better tendency and further reduction of prices has been avoided. The reason is not that numerous orders have been placed but that the rate of exchange, together with steadier prices from Germany, have assisted makers in maintaining quotations. Bars for export, quoted at £6 5s. up to £6 7s. 6d. (1.26c. to 1.28c. per lb.) may be had at £6 2s. 6d. (1.23c.) for good and large specifications (prices per gross ton fo.b. Antwerp.) Germans, it is reported, have accepted £6 2s. 6d., f.o.b. Continental ports, for smaller quantities.

Prices for steel sheets are as follows:

	Fr.	Per Lb.
Thomas: 0.5 mm. (No. 25½ gage)	1,250 or	$62.50 (2.83c.)
1 mm. (No. 19½ gage)	1,100 or	55.00 (2.50c.)
2 mm. (No. 14 gage)	820 or	41.00 (1.86c.)
3 mm. (No. 11½ gage)	730 or	36.50 (1.66c.)
5 mm. and over (No. 6½ gage)	670 or	33.50 (1.52c.)
Galvanized: 0.5 mm	2,250 or	112.50 (5.10c.)
1 mm	1,750 or	87.50 (3.97c.)
Polished sheets, as an average	1,500 or	75.00 (3.40c.)

For heavy materials German prices remain by far the lowest. Their prices for 5 mm. sheets (3/16 in.) are £7 2s. 6d. or $32 (1.45c. per lb.) f.o.b. shipping port, with about £8 for ⅛-in. (3 mm.) sheets, i.e., $36 (1.63c) or fr. 720. Polished and lighter sheets, per contra, are at the prices in the table.

The market for semi-finished steel products is not busy. Prices offered, especially from England, our largest customer for this commodity, are lower than actual quotations, which are:

	Fr.	
Billets, soft Thomas steel	500 or	$25.00
Blooms	470 or	23.50
Largets	530 or	26.50

The billet price represents £5 10s. ($24.75) f.o.b. Antwerp, a price no longer obtainable in London. Other prices, all lower than a fortnight ago, and with business nearly nothing, are as follows:

	Fr.	
Wire: galvanized	1,240 or	$62.00 (2.81c. per lb.)
barbed	1,400 or	70.00 (3.18c. per lb.)
plain	1,000 or	50.00 (2.27c. per lb.)
annealed	1,050 or	52.50 (2.38c. per lb.)
Wire nails	1,000 or	50.00 (2.27c. per lb.)
Steel bands	750 or	27.50 (1.25c. per lb.)

The pig iron market is certainly not in a better position. Inland demand is very small and offers from abroad are under the market price. Ruling quotations are:

	Fr.	
Phosphorus foundry No. 3	360 or	$18.00
Thomas steel pigs	360 or	18.00
Half-phosphorus foundry	380 or	19.00

Luxemburg and Lorraine pig iron of the same quality is quoted at the same prices. English hematite pig iron is still sold and this at the reduced price of £5 c.i.f. Antwerp ($22.50). Orders booked are not large.

EXPORT BUYING LESS ACTIVE

Inquiries Few and Small—40,000 Tons of Caucasian Ore Bought

NEW YORK, Sept. 9.—Activity in export buying is at low ebb. Demand from Japan, the most persistent buyer, has been very light and, after the flurry of buying in wire shorts was over, following the recent reduction in prices asked, the Chinese market became quiet. What activity exists is principally in machinery, with occasional small purchases of sheets and plates. Few exporters look for a revival in demand before the end of the year, although a movement in exchange favorable to Japan might send considerable business this way. One large firm reported a slight improvement in sheets and structural material; then a contradictory view is expressed in a letter from the manager in Japan of a big steel producer who states that the Japanese Government has more materials on hand than can be used for some time.

There has been some return of merchant buying in black sheets, principally from Japan. Two leading interests are quoting these at $93 to $93.50 per ton, c.i.f. In addition to 1700 tons of sheet steel piling recently bought through New York by the Tokio Reconstruction Bureau, it is inquiring for 1250 pieces of sheet piling of 22-ft. length. There is no uniform opinion about merchant stocks in Japan. While one thinks they are diminished, another believes there is an abundance on hand. The value of iron and steel products imported by Japan in the first half of 1924 is about $117,937,000.

Bids will be received until Oct. 31 at the offices of the Commissioner General of State Railroads, Bangkok, Siam, for 500 axles and 1000 wheels.

Within the last few days an order was placed here for 40,000 to 45,000 tons of Caucasian manganese ore at a price a shade under the prevailing level of 45c. per unit. Few inquiries are coming for North African ores. Shipments of Bilbao ore for the first half of the year are 852,823 metric tons and there are 50,000 tons more on hand now than at the end of 1923. One feature is worth noting about imports of steel; that is that very little is coming from Germany. And in the opinion of the head of a firm doing a large international business, there is scant probability that German producers will affect domestic prices.

DULL BUT OPTIMISTIC

Luxemburg Iron and Steel Market Competing on Basis of World Prices

LUXEMBURG, Aug. 26.—The situation of the Luxemburg iron and steel market has been extremely difficult since June. The fall of the franc, accentuated in July, caused a further depreciation of the prices during that month. The London Conference results, which were expected to bring a revival in trade, has caused extreme reserve on the part of buyers, who cover only their immediate needs. At the same time, the holidays which have passed have had a depressing influence on world markets.

Therefore the Luxemburg industrials who cannot find sufficient outlets at home have had to dispute with foreign competitors on the neighboring markets the few orders passing on, while they were making price concessions to keep their works going. Though prices are often lower than cost, no blast furnaces have yet been stopped, because any reduction of output would be ruinous.

World Prices Once More Effective

Encouraged by the revival of Anglo-American exchanges, sellers have shown a more effective resistance during the last few days. The parities in francs fixed in pounds have practically reached the level of the prices in francs, so that a certain stabilization has been noticed, thus somewhat facilitating demand. One wonders if the increase of prices in pounds does not correspond to an improvement of demand on the export market. On the whole, while the dullness continues, the tendency is more favorable.

For export the Luxemburgers ask for pig iron the same prices as Belgians: for chill-cast iron No. 3 the basic quotation is 340 fr. ($17.39) and 330 fr. ($16.86) for forge pig iron. In semi-finished products the Luxemburgers are inclined to quote lower than the Belgian plants, this being due perhaps to their production being larger. The following quotations are recorded: blooms, 460 fr. ($23.50); billets, 490 fr. ($25.04); largets, 515 fr. ($25.32). In steels the plants are quite active; beams are quoted at 535 fr. (1.22c. per lb.), and bars at 545 fr. (1.24c. per lb.).

KEENER COMPETITION

Abolishing of Pittsburgh Basing Blamed for Low Prices—Youngstown Orders Increase

YOUNGSTOWN, Sept. 9—District steel makers report a steady inflow of new business, in sufficient volume to sustain the production rate, which has been steadily mounting the past two months. Strip makers are the recipients of substantial tonnages and district hot strip capacity is fully engaged this week. There is a wide range in prices, the wider sizes ranging down to 2.25c. per lb., with the narrower widths commanding up to 2.75c. Much of the strip produced in this territory is being shipped to the Detroit district and to the automotive interests in other places.

Evidences that the railroads are coming into the market in a more active way are accumulating. A district car builder and car repair interest recently increased its production to take care of expanding business. With bars, plates and shapes down from $8 to $12 per ton from the high prices of the year, carriers are being attracted to the markets. One interest estimates it costs from $250 to $300 less to purchase a freight car now than it did six months ago.

Indications grow, according to the comment of industrial observers in this section, that the Federal Trade Commission ruling against the Pittsburgh price basing custom is creating keener competition than originally anticipated. Producers in some competitive districts are reported to be cutting away from the Pittsburgh base and naming instead mill quotations.

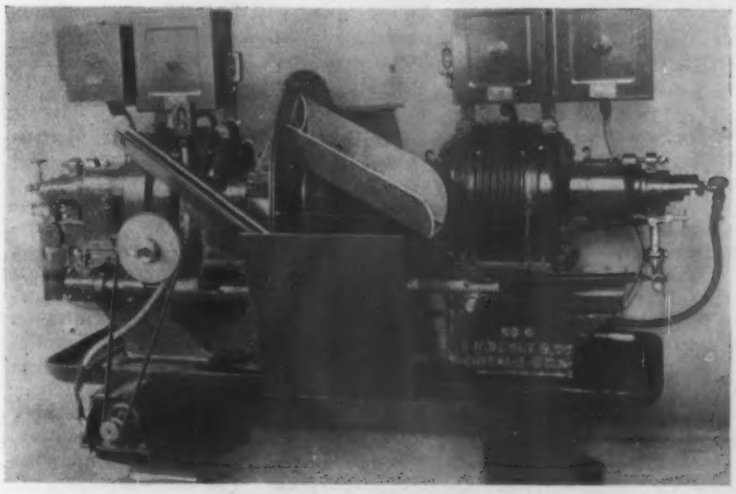
It is suggested here that further steel mergers between companies with plants in different localities may be an outcome of this situation.

An official of the Youngstown Sheet & Tube Co. declares that finished steel buying shows more life and further improvement is predicted. An increase of 50c. per ton in the company's price of pig iron at Chicago is forecast for this week. The Sheet & Tube company has increased its active iron capacity in the Chicago district by the lighting of an additional blast furnace. It is now operating seven of 17 stacks, including three of eight at Chicago.

Unfilled orders in rolled steel have not materially increased, as production has been expanded in proportion to improved buying of recent weeks.

Automatic Grinding of Thrust Washers

The rough grinding of 1800 bronze thrust washers an hour and the finish grinding of 2400 of the same parts in an hour is claimed for the automatic wet disk grinding machine illustrated, which has been placed on the market by Charles H. Besly & Co., 118 North Clinton Street, Chicago. The machine, which is designated as the No. 6—20 in.—I-type grinder, will be recognized as similar to the No. 6—18 in.—I-type double-spindle direct-connected motor driven unit described and illustrated in THE IRON AGE of July 31. A distinguishing feature of the machine illustrated herewith is the rotary type feeding disk.



Disk Grinding Machine Equipped with Rotary Feeding Disk for Grinding Automatically the Sides of Bronze Thrust Washers. The washers are both rough and finish ground

The washers, which are of cast bronze, are 3⅛ in. in diameter, ⅛ in. thick and have a 2¼-in. hole. Because of the close accuracy required and the large amount of stock to be removed, two operations, roughing and finishing, are necessary. In the first operation the washers are rough ground to within 0.008 in. of finished size, removing about 0.020 in. from each side. On this operation the production is 1800 pieces an hour, and where the amount of stock to be removed from each side is 0.015 in., the production claimed is 2400 pieces an hour. In the second operation, which consists of finish grinding the washers to limits of plus or minus 0.0005 in. parallel, to within 0.0005 in. of the given size, the production is 2400 an hour.

The feeding disk is of heat-treated carbon steel, is 3/32 in. thick and is provided with four holes equally spaced. In operating the machine, the washers are placed in the inclined chute by the operator and are fed automatically into the holes in the feeding disk. The washers are then carried down between the guide plates to the underside of the grinding disks and when they are approximately ½ in. from the grinding disks, the latter open. This permits the work to enter two-thirds of the way. Cams on the outer ends of the spindle serve to bring the grinding disks together gradually as the feeding disk is carrying the work through the machine. When the work has reached a point about ½ in. from the outer edge of the grinding disk, the cams release the pressure on the disks and the finished part comes out at the top, while another washer is being fed in at the bottom.

After being ground, the work is ejected automatically from the feeding disk into the chute, from which it rolls into a suitable receptacle. The grinding wheels run in opposite directions, which causes the washers to rotate slightly while being ground and is said to assure close parallelism.

Each of the two grinding heads is driven by 7½-hp. motor as shown, the two units being attached to bed plates which are adjustable along the bed of machine. The arrangement of the spindles is similar to that in the machine previously described and micrometer adjustment is provided for each spindle. The work-feeding fixture is driven by a ¼-hp. motor which is belted to a friction pulley, driving the main feeding disk spindle through reduction worm gearing. The cam mechanism controlling the opening and closing of the left-hand spindle is operated from the feeding fixture through silent chain and bevel gearing. Push button control is provided for the motors.

J. Frank Lanning of J. Frank Lanning & Co., Pittsburgh, will be the speaker at the first fall meeting and dinner of the Pittsburgh Foundrymen's Association to be held Monday evening, Sept. 15, at the General Forbes Hotel, Pittsburgh. His subject will be "Some of the High Places I Have Hit." The talk will be illustrated by motion pictures.

Charging Truck Takes Power from Trolley Line

A charging truck for handling malleable iron pots and which, in place of the usual storage battery as a source of power, is equipped with a direct-coupled Hertner motor generator set as shown in the accompanying illustration, has been placed on the market by the Baker R. & L. Co., Cleveland.

The motor generator set receives 220 volts direct current from the trolley and delivers 24 volts to the truck motors. The generator is compounded so that uniform voltage is furnished at all loads. A Haywood spring take-up reel is provided to keep the trolley taut, this being mounted beside the motor generator, as shown.

For Handling Heavy Loads Around a Malleable Castings Plant, the Electric Truck has been Fitted with a Motor Generator Taking 220-Volt Current by Means of a Trolley and Delivering 24-Volt Current to the Truck Motors

The truck is rated to pick up and carry a stack of pots weighing 6000 lb. Hooks on the fork castings permit the operator to remove the heavy doors from the ovens. Openings are usually provided in these doors where the forks may be run in, and a chain is thrown around the door over the hooks on the fork castings to steady it while in motion.

Ohio State Foundrymen's Convention at Cleveland

At the convention of the Ohio State Foundrymen's Association, to be held at Cleveland, Sept. 18 and 19, addresses will be delivered Thursday afternoon as follows: "Industrial Liberty and Its Responsibility," Walter Gordon Merritt, League for Industrial Rights, New York; William H. Barr, president National Founders' Association, a subject of his own selection; "Various Foundry Cost Methods—Correct and Incorrect," E. T. Runge, E. T. Runge Cost Co., Cleveland; "Why the Ohio State Foundrymen's Association?" C. C. Smith, Toledo Steel Casting Co., Toledo.

A banquet will be held Thursday night, and Friday morning and will be devoted to a sightseeing trip. In the afternoon, R. M. Hudson, chief of Division of Simplified Practice, Department of Commerce, Washington, will speak on "Simplified Practice—A Profit Making Policy," and the subject of E. S. Carman, chief engineer, Osborn Mfg. Co., Cleveland, will be "Reducing Production Costs." Headquarters will be at Hotel Cleveland.

Three of the eight continuous furnaces to serve the 14-16-in. skelp mill at the Gary tube works, National Tube Co., will be built by the Chapman-Stein Engineering Co., Mt. Vernon, Ohio. The others will be built by the company itself.

Gradual Increase in Operation at Youngstown

YOUNGSTOWN, Sept. 9.—Production schedules of Valley iron and steel properties indicate increase of tonnage in a steady way, in rolled steel products. This week all of the merchant steel bar mills in the Mahoning Valley are engaged for the first time since the beginning of the recent upturn in the steel industry. The Youngstown Sheet & Tube Co. is operating its 9-in. and its 12-in. mills; the Republic Iron & Steel Co. five light bar mills and its 14-16 in. unit, and the Carnegie Steel Co. 18 bar mills divided between the Upper and Lower Union mills and the McDonald works.

For the first time since early this year, the Trumbull Steel Co. is operating all seven open-hearth furnaces at its plant in Warren, and all other units are in commission.

Ingot production is averaging between 75 and 80 per cent in the district, with 38 of the 52 independent open-hearth furnaces melting.

The Sheet & Tube company is pushing to completion at its East Youngstown plant reconstruction of a blast furnace, and plans to blow in this stack the last of September.

Of 120 sheet and jobbing mills in the Valley, 85 are scheduled, a slight loss as compared with the preceding week, owing to suspension by the Waddell Steel Co. at Niles of its active mills.

Of the 45 blast furnaces in the Youngstown district, 18 are melting, producing about 45 per cent of the total iron capacity of the district.

Decision Favorable to Malleable Iron Manufacturers

The recent action of the United States Commissioner Charles Lusk, at Chattanooga, Tenn., in dismissing G. F. Meehan, president Ross-Meehan Foundries, Chattanooga, charged in an embankment with violating the Sherman anti-trust act, is regarded as important and is indicating that similar action may be taken in regard to numerous members of the American Malleable Castings Association, who are now under indictment.

Commissioner Lusk held that there was nothing illegal in the information bureau of the association, and that there was no evidence to show that it was ever used for any illegal purpose. The commissioner expressed the opinion that Mr. Meehan had not been shown to be connected with any illegal combination and also that there was no probable cause for believing that any such combination existed.

For the first time since its acquisition of the Thomas sheet mills at Niles, Ohio, from the Youngstown Sheet & Tube Co., the Thomas Sheet Steel Co. is this week operating nine mills. Heretofore the company's active capacity has been limited chiefly to six mills. Additional capacity will be ready for rolling the week of Sept. 15, officials announce. The Thomas company has been engaged in a program of modernization, and construction work is now under way on two mills of six in the group not yet affected by the previous reconstruction. New furnaces, motors and gears are included in the installation.

Increasing industrial demand for gas heat is one of the subjects to be discussed at the annual convention of the American Gas Association to be held on Atlantic City's Steel Pier, Oct. 13 to 17, inclusive. There will be a gas exhibit of 170 manufacturers of gas appliances.

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ESTABLISHED 1855

THE IRON AGE

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Metal at 5000 Diameters

ONE marvels as he contemplates the present status of heat treatment, the common use of complex heatings and coolings on highly alloyed steels, and the ability to pick out a steel and a treatment which will give a specified combination of physical properties. And as he thinks back to the time, only a few years ago, when the blacksmith knew all that was known of the art, he cannot but call blessings on the head of Sorby, who first examined metal under a microscope.

Of course, all of the phenomenal advance in the science now known as "physical metallurgy" cannot be ascribed to this one instrument. Pyrometers were equally indispensable. Delicate testing instruments also have enabled the investigator to measure the effects of any given experiment on the properties of his metal. The phase rule, scarcely less abstruse than Einstein's relativity to most of us, has played no mean part in systematizing the great mass of available data. Nevertheless, the microscope is chiefest of these. It has enabled the student to see what he is doing—without it he truly would be groping in the dark.

Therefore one hesitates to appraise the potentialities and the limitations of microscopy at the very high powers now being used by a few skilled investigators and discussed by steel treaters generally. Forty years ago the wiseacres doubtless were complimenting Sorby on his brilliant idea and pretty pictures and then saying, "Yes, but what do these peculiar markings mean?" A riddle like the canals on Mars—quite evidently nothing that practical steel makers could ever use in their business!

He would have been a rash prophet who predicted that very shortly (as time goes) the metallurgical microscope would be found in every laboratory of any pretension and used as first aid in diagnosing any trouble cropping up during operations; or that the best steels would be manufactured under rigid microscopic inspection and bought under specifications calling for definite microstructure.

If 50 diameters have done so much, what can 5000 show us? The only guess we can hazard is that it will open up new fields of knowledge at present only dimly realized. Of course, the technique will have to be developed. Special skill and care will be necessary in adjusting the microscope and its various attachments. A new and highly refined routine of polishing and etching will have to be discovered, so the true structure will not be smeared over or eaten out. Only the finest lenses can be used, so that the metallographist will get real "definition" and not merely an enlargement of a smaller picture. But these details are commonplace. None of them looms so large as many others which have been successfully overcome.

Then high-power microscopy will step into the gap now existing between the ordinary low-power work and crystal analysis with the X-ray. The latter has done more to advance our knowledge of ultimate metallic structure than anything else. But it works best on crystals far too small to be ever reached by visual methods. It will tell us, for instance, the real atomic spacing and the nature of martensite. The ordinary microscope, on the other hand, interprets the structure of pearlite. But there is a long range of metallurgical possibilities between ultramicroscopic crystals of hardened steel and the comparatively large crystals of annealed metal, which are seemingly structureless, except that we infer their constitution from analogy, and which are called troostites and sorbites. True, all troostites look alike. Yet they result from a rather wide variety of heat treatments and represent steels quite different in toughness, endurance and other physical properties.

Perhaps this region can now be explored. If it is known it can be controlled. And if it is controlled it can be used. Here is a job for the high-power microscope.

Rail Tonnage for Replacements

THE pending inquiry of the New York Central Railroad for rails running up to 127 lb. per yard and the vogue of rails up to 130 lb. on some lines mean a greater tonnage of steel to be produced for rail replacements, for what a railroad does is to replace a given number of miles, not to lay a given number of tons. The rail production statistics have been giving a rough idea from year to year of the increasing use of the heavy rail.

When, a little over a quarter of a century ago, the Carnegie Steel Co. took over the Pittsburgh, Shenango & Lake Erie and rebuilt it as the Bessemer & Lake Erie, it used 100-lb. rails, then quite a novelty. No doubt an incidental consideration was to advertise the 100-lb. rail to other roads. Last year, however; 1,465,850 tons of rails were produced of sections 100 lb. and over, or more than double the tonnage of such rails produced in any year prior to 1916. There was, in fact, a gradual increase to 902,900 tons in 1922 and then a jump of 62 per cent for the next year.

For comparing with 1923, the year 1901 is convenient, for the tonnages of standard rails produced were much the same. Disregarding for 1901 the 155,406 tons of rails under 45 lb., and for 1923 the 272,794 tons under 50 lb., production was 2,719,233 tons in 1901 and 2,631,722 tons in 1923. The distribution was as follows:

	Gross Tons
1901:	
45-lb. and under 85-lb.	2,225,411
85-lb. and over	493,822
1923:	
50-lb. and under 85-lb.	300,907
85-lb. and under 100-lb.	864,965
100-lb. and over	1,465,850

It is obvious that the 1923 tonnage would lay many less miles than that of 1901, though the production was but 3 per cent less. Only a rough approximation can be made as to the mileage involved, but give it the benefit of the doubt the 1901 rails are assumed to have averaged 70 lb. and 92½ lb. respectively, and the 1923 rails 70, 90 and 110 lb. respectively. On these assumptions the 1901 rails would lay 24,000 miles of track and the 1923 rails less than 17,000 miles. Allowing for the 3 per cent difference in tonnage, this represents between 25 and 30 per cent reduction in the mileage, for the same total tonnage.

The factors influencing the total production of rails are rather interesting. The net result has been to make the production of rails much steadier, over a period of many decades, than the production of any other important steel product. First we engaged in building new roads very extensively, with a maximum of 12,984 miles in 1887, at the end of which year we had 149,281 miles in operation, i.e., 57 per cent as much mileage of road 37 years ago as at present. The production of rails in 1887 was 2,139,640 tons, and it was not until 12 years later that this record was broken. Then there was a period in which much secondary track was laid, and with the advent of much heavier rolling stock the relatively light rails originally laid played out rapidly, necessitating a great deal of replacement. Production of rails accordingly rose to a new high peak in 1906, 3,977,887 tons, which has now been the record for 17 years. Subsequently the laying of new track dropped to insignificant proportions while at the same time increasing traffic necessitated more replacements.

In recent years the longer service given by rails of better quality and heavier section has tended to offset the influence of increasing traffic and greater tonnage required per mile of replacement. Thus in the past ten years the total rail output averaged 2,455,000 tons, whereas in the preceding ten years, 1904-13, it was 3,150,000 tons, or nearly 30 per cent more. On the contrary, the average production of all other finished iron and steel products in the past ten years was more than 50 per cent above the average for the preceding ten years, or 24,577,000 tons against 15,838,000 tons.

The Work We Do

THE income of the American people is derived from the production of goods and the performance of service; that is, it is derived from labor. There is nothing else from which it can be derived. The national income, therefore, is fundamentally a function of the number of hours of labor done by the people, modified by the nature of the work they do and how they do it. At the present time the American people comprise about 44 million workers. If they do an average of 2500 hours of work per annum the total is about 110,000 million hours per annum. Given a certain standard of organization and management, a certain equipment of tools, and a certain degree of human efficiency, the production of goods and service would attain a maximum if 110,000 million hours of work were done.

We do not, in fact, ever attain that theoretical maximum. Time is lost through sickness, through disputes between employers and employed, through seasonal conditions that do not permit certain work to be done, through maladjustments that lead to more men being attached to an industry than is needful, and to irregularities in the economic system that often throw workers out of employment while equilibrium is being restored.

There are no comprehensive statistics showing the hours of work actually done in American industry. Roughly speaking, about one-fourth of all workers are engaged in agriculture, the major part of them as proprietors, all of whom work under extremely irregular conditions. The farmer has certain periods of long hours and high intensity, other periods of relative inactivity. It is probable that on the average the farmer does not work so long and so hard as he thinks he does. In a well-considered paper on this subject, not long ago, the author of it came to the conclusion that the farmer probably averages about eight hours a day, considering the year as a whole.

In other industries a working time of 60 hours per week, or 3000 hours per annum, used to be common. At present the average is far short of that. In manufacturing, the nominal week of work, which so recently as 1914 was 55 hours, at present is not more than 50 hours. In the transportation industry the average is probably no higher. In building it is much lower, probably being no more than 44 hours on the average, while in

some of the important branches it is as low as 40 hours.

Although there are no comprehensive statistics on this subject to which we can turn, we have plenty of evidence that the weekly hours of work in the United States have diminished substantially during the last 10 years, while the annual hours of work have diminished in even greater ratio owing to increase in the number of holidays, extension of vacation periods, etc. It is probable also that reduction of working hours through inability to function has increased since the war, owing to economic maladjustments, which have led to more workers becoming attached to some industries than can be continuously employed in them.

Bituminous coal mining is a pre-war example of this, but since the war there have been others, reflecting new dislocations. Thus the transfer of cotton manufacturing to the South and of boot and shoe making to the West has created more idleness among the workers in those industries in New England.

Even such a broad industry as steam railroading showed wide variations in employment in such a steady year as 1923. In that year the number of employees ranged from the minimum of 1780 thousand in January to the maximum of 1974 thousand in August, falling to 1794 thousand in December. This illustrates how with our present imperfect economic organization we must always allow for a certain loss of time through seasonal and other disturbances of equilibrium. In the course of time, with increasing knowledge of economic conditions, we shall reduce the range between such extremes. Our first great objective, however, is to eliminate the unemployment that is associated with some industries all the time.

For example, if we could detach about 200,000 men from the bituminous coal mining industry and divert them to building operations, we should accomplish two undeniable benefits. We should reduce the cost of bituminous coal by releasing that industry from the obligation to support unnecessary men and we should reduce the cost of houses by furnishing more men wherewith to build them. It would be the job of engineers to make mechanics out of coal miners, which would not be an impossible task. This is a simple illustration of what must be done in effecting economic readjustment.

Progress in Alloy Steels

PREDICTIONS made only a few years ago are being fully realized in the alloy steel industry. More alloy steel of all grades was made in 1923 than ever before in proportion to the country's total steel production. As discussed in a review elsewhere in this issue, the ratio of total steel to alloy steel has dropped to 21.3 to 1 in the last two years. Ten years ago it was 43.8 to 1. The larger proportion of alloy steels produced in electric furnaces in 1923, particularly castings, is worthy of note. Nearly 10 per cent of the total of 2,106,489 tons of alloy steel ingots and castings produced last year came from the electric furnace. Of the 92,220 tons of alloy steel castings 29,054 tons was produced in the electric furnace, or more than in any two previous years.

Ferroalloys and electric furnaces, the real basis of the alloy steel industry, first appeared in Europe, but this country has brought both to a high degree of development. The future is full of promise both as to output and metallurgical progress. New ferroalloys and new alloy steels are appearing, in view of the larger field opening up for the stainless alloy industry, the greater use of alloy forgings and castings in locomotive construction, and the applications in other fields in which research has found much encouragement.

The Phases of Discontent

AS progress is being made in the study of psychology in industry it is well to apply the results of the study to the two great public phases of discontent, as exhibited in political matters and as shown in employer-employee relations.

The gathering of the discontented around a political candidate is no new thing. It is the usual phenomenon. New parties and new political preachments receive their strength by men disliking certain things rather than by their developing in the first place a liking for some new thing. Much of the favor Mr. Bryan received in 1896 was traceable to dislike of the gold standard rather than love of the silver standard. Mr. Cleveland was a good president, but the chief factor in his election, as was commonly known at the time, was that the people "wanted a change."

Such favor as La Follette is receiving or is expected to receive is everywhere recognized as being due to discontent. The various groups that are being appealed to have but one thing in common, that they are discontented. They are in wide disagreement, both as to the causes of what they consider wrong and as to the remedies that should be applied.

When employer-employee relations are unsatisfactory there is, of course, discontent. What is the precise character of that discontent? Is it envy, excessive ego, laziness, or what? When, several decades ago, profit sharing was being hailed as the great remedy for labor discontent, the idea, whether definitely formulated or not, was that envy was the phase of the discontent which it was sought to remove. Inasmuch as profit sharing has not fulfilled expectations, one may begin to doubt whether envy is the mental attitude. If it is envy, it is envy of individuals. We could classify groups of discontented workmen according to whether the owners of the facilities—the tools—with which they work are a few very rich men or a large number of persons, including widows and orphans, possessed individually of but little wealth. If we should find that the employees of the Ford Motor Co. and the Standard Oil Co., for instance, are more discontented than the employees of the railroads, we should have a concrete point.

Some employers who have investigated in their own cases have found that much discontent is due to the manner of foremen. The foreman fails to recognize that the man under him is entitled to a reasonable amount of ego. We might find that

such a condition is fairly general. If so, the first thing to do would be to force recognition of the proper amount of ego and the next would be to endeavor to remove excessive ego when found to exist.

Then there is what was referred to above as laziness, but which often may be described as indifference. The indisposition to perform a certain task may be due to its humdrum character or to lack of connection between the employee's personality and the thing to be done.

We shall make progress if we analyze the mental state that involves the discontent. We shall see, for instance, whether an employee is discontented because the employer is rich or because he has the power to give orders, or again, whether the man wishes to get away from what he is doing or wishes to get to doing something that is better.

AUGUST STEEL OUTPUT

Decided Increase, Daily Rate Up About 36 Per Cent—Yearly Rate About 30,400,000 Tons

A large increase was made in the steel ingot output in August over that of July. The daily rate last month was 97,750 gross tons as compared with 71,900 tons in July—an increase of nearly 36 per cent. The industry went back last month to just above the volume in May, when the daily rate was 97,343 tons, the second month in the four-month recession.

The statistics of the American Iron and Steel Institute show that the August output of the companies which made 94.84 per cent of the country's total in 1923 was 2,410,360 tons. Thus, assuming that the 5.16 per cent not reporting produced at the same rate, a total July output is indicated of 2,541,501 tons. The equivalent annual rate is about 30,400,000 tons, or about 56 per cent of capacity against 41.5 per cent in July.

The table gives the production by months of the different kinds of steel, together with the estimated daily rate for all companies.

Monthly Production of Steel Ingots, Reported by Companies Which Made 94.84 Per Cent of the Steel Ingots in 1923 (Gross Tons)

Months, 1924	Open-hearth	Bessemer	All Other	Calculated Monthly Production All Companies	Approximate Daily Production All Companies, Gross Tons
Jan.	2,766,534	667,032	12,577	3,633,639	134,579
Feb.	2,902,641	695,905	14,085	3,809,185	152,367
March	3,249,783	706,801	15,260	4,187,942	161,075
April	2,575,788	573,381	12,356	3,333,535	128,213
May	2,060,896	425,099	6,648	2,628,261	97,343
June	1,637,660	310,070	2,622	2,056,466	82,259
July	1,525,912	241,880	5,162	1,869,416	71,901
Aug.	2,042,820	361,781	5,759	2,541,501	97,750
8 mos.	18,762,034	3,981,949	74,469	24,059,945	115,673
1923					
Jan.	2,906,892	728,270	9,467	3,841,095	142,263
Feb.	2,613,564	669,903	10,797	3,471,843	144,660
March	3,046,309	799,525	12,841	4,066,680	150,618
April	2,974,579	772,485	13,933	3,963,736	158,549
May	3,136,558	847,418	16,719	4,216,355	156,161
June	2,821,239	737,845	15,488	3,767,256	144,894
July	2,658,449	680,884	11,496	3,531,458	141,258
Aug.	2,796,370	701,059	9,326	3,695,788	136,881
8 mos.	22,953,960	5,937,389	100,062	30,554,211	146,895
Sept.	2,562,771	613,709	8,602	3,356,776	134,271
Oct.	2,735,513	649,452	9,163	3,577,091	132,485
Nov.	2,348,361	616,335	9,309	3,134,321	120,551
Dec.	2,135,898	570,004	10,912	2,863,266	114,531
Total	32,736,503	8,386,889	138,048	43,485,665	139,825

Receiver Appointed for St. Louis Coke & Iron Co.

James Duncan, president Litchfield & Madison Railway, has been appointed receiver of the St. Louis Coke & Iron Co., with general office and plant at Granite City, Ill., in friendly proceedings brought in the United States Court at Springfield, Ill. A statement issued by the company says: "Owing to the temporary depletion of working capital, a friendly receiver has been appointed to conserve the assets of the company, and its operations will continue as usual."

The company was incorporated in March, 1923, as successor to the St. Louis Coke & Chemical Co., a Maine corporation. Its plant, built in 1919-20, consists of 80 by-product coke ovens and one blast furnace of 500 tons daily capacity. It owns all capital stock of the St. Louis Coal & Iron Co., which operates the Black Brier coal mine situated in southern Illinois. Its capital stock consists of 100,000 shares of class A common, nominal par at $5; 240,000 shares of class B common, same par value; $10,000,000 7 per cent cumulative preferred of $100 par value. On May 1, 1923, there were outstanding 89,400 shares of class A common and $3,099,100 in preferred.

As a result of two financial readjustments made at the peak of interest charges, the reorganized company took on a burden of $1,230,248 per year in fixed and contingent charges. Strikes, advancing costs of material and labor, and other causes, made the readjustment necessary at that time.

In May, 1919, the National Enameling & Stamping Co., New York and Granite City, bought 12,500 shares of cumulative preferred and 12,500 shares of common stock of the St. Louis company for $1,250,000. Contract rights agreed upon in this deal provided for building a steel plant, coke and tar plant and a blast furnace to supply hot metal to the Enameling Company. This company owns $4,930,170 in first mortgage sinking fund 6 per cent bonds of the St. Louis company. The plan announced over a year ago by the Coke & Iron company to build another blast furnace was not carried out.

Reduced Prices in Germany Affect Machine Tool Industry

WASHINGTON, Sept. 8—The moderate fall in the level of all German prices as it had proceeded up to the middle of July has affected the machine tool industry, according to a report received by the Department of Commerce from Trade Commissioner Douglas Miller, Berlin. Prices have been so far out of line with those quoted by foreign competitors that German firms have temporarily been out of active competition for several months and must now face the fact that they will have a great deal of hard sledding to do before they can reestablish themselves in the strong position they held up to last year's high prices.

Prices of tools are still falling and the result is now beginning to be felt in a small increase in orders. This turn set in early in August and was the first improvement in demand in many weeks. The report points out that there has been an increased demand for high-speed cutting tools. Inquiries for drills also have shown an increase, especially for the best quality equipment. The price of high-speed steel has risen and this is affecting the price of drills. Reamers are in increased demand.

There is still a steady trade in odd sized tools and devices not conforming to the German standard specifications. It is declared that the resumption of steady work will revive some plants that have fallen away from the standards previously adopted on account of the hard times and the necessity of doing anything that came to hand.

Increased orders are reported from the Saxon tool market. The Ruhr reports unchanged conditions. Export business is bad, particularly in Europe. It is holding up to some extent in the Far East and the Balkans. There are renewed hopes of doing business with the Soviet Government.

Iron and Steel Markets

ABOVE 55 PER CENT

Steel Works Operation Largest in Four Months

At 93,000, Car Orders Nearly Equal 1923 Total—Sharper Competition in Steel

While August orders taken by practically all producers of steel showed good gains over the July totals, reports as to the first week of September are not uniform. Chicago, in view of the new railroad demand and of "well diversified" orders from other sources, finds a continuance of the August improvement. At Pittsburgh and several other centers a halt in the week-to-week gain of August is noticed.

The trade was frankly surprised at the extent of the August increase in steel ingot production. At 97,750 tons a day, it was 36 per cent above the July average of 71,901 tons, and whereas the July output was at 41.5 per cent of capacity for the whole industry, that of August was at 56 per cent, counting 173,600 tons a day as capacity.

The large August increase shows that curtailment in July was overdone, also that many buyers required prompt shipments from the mills, and thus that the good-sized business of August left no corresponding improvement in order books.

Due to the marked gain in steel works operation since July, more steel making pig iron is needed, and both the Steel Corporation and the independents are adding a few furnaces to the active list.

Comparisons are being made between the total of 93,000 freight cars ordered thus far in 1924 and the total of 95,595 for all of 1923. The former figure includes 10,000 cars just placed by the Pennsylvania Railroad and 2000 by the Texas & Pacific. Further considerable orders are looked for, as the St. Louis-San Francisco is inquiring for 8000 and the Reading for 3000, and several other roads are about to enter the market.

Locomotive buying also gives better promise, the Missouri Pacific order for 50, divided between two Eastern builders, being the largest in some time. The Baltimore & Ohio and the Lehigh Valley are also expected to buy. An inquiry from New South Wales is for 25 engines, and an order for six from India has come to Philadelphia.

The week's awards of structural steel work, slightly under 11,000 tons, of which 3000 tons was for oil storage tanks, were the smallest reported in 1924. The total pending, at only 10,200 tons, is also considerably below the average for the year.

The automobile industry is increasing its production schedules and demand for steel from that source is greater than in August.

Again larger mill operations have brought sharper competition. In several directions in the past week fresh concessions have appeared. Rerolling billets have sold at $36, Pittsburgh, and in one instance $2 a ton lower is reported.

Mills which led in making low prices on plates now find that the decline has passed their cost line. Some sales have been made in the past week at 1.65c., Pittsburgh, and even as low as 1.60c. has been done. Structural material is also weaker in the East, some mills which had attempted to hold to 2c. having sold quite freely at 1.90c.

Concrete reinforcing bars are slightly weaker, sales having been made at 2.05c., Pittsburgh. The award of 2500 tons for a warehouse at Baltimore is being watched with interest as an index of the price trend.

The report persists, though not officially confirmed, that the American Sheet & Tin Plate Co. will put sheets on a Chicago base. Definite announcement concerning other phases of the new basing situation is expected shortly.

Inquiry for pig iron in New York represents about 25,000 tons and buying along the Lakes is fairly active. At Pittsburgh the market is extremely dull, and recent advances are being maintained with difficulty. Shipments in general have increased moderately during the past few weeks. Two merchant blast furnaces have been blown in.

Some improvement in foundry operations is seen in the Chicago district and elsewhere. Automotive foundries are taking forward malleable pig iron on which they had suspended shipments, and steel foundries and makers of carwheels will be busier in view of railroad equipment orders.

The IRON AGE composite price on seven finished steel products is 2.496c. per lb. this week, against 2.51c. one week ago. That on pig iron remains at $19.46 per ton, which is $5.83, or 23 per cent below the figure of one year ago.

Pittsburgh

Gain in Some Finished Products Not So Pronounced—Pig Iron Dull

PITTSBURGH, Sept. 9.—Some of the recent optimism has gone out of the reports about steel business. While the flow of orders of the past week as a whole probably has been up to that of the previous week, the week to week gain in the bookings is less generally stressed. Some further gain is observed in ingot production in the Pittsburgh and nearby districts, but it seems to be based at least partly on what the future is expected to produce, since few manufacturers have backlogs of any considerable size and there are admissions that the present rate of production is partly for the purpose of building up reserves. The market does not yet give positive signs that prices have struck bottom and this encourages a conservative buying policy.

For the first time since the nominations, the Presi-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 9, 1924	Sept. 2, 1924	Aug. 12, 1924	Sept. 11, 1923
No. 2X, Philadelphia‡	$21.76	$21.76	$21.26	$26.26
No. 2, Valley Furnace†	20.00	20.00	19.00	25.00
No. 2, Southern, Cin'ti†	21.55	21.55	21.55	27.55
No. 2, Birmingham, Ala.†	17.50	17.50	17.50	23.50
No. 2 foundry, Chicago*	20.50	20.50	20.50	27.00
Basic, del'd, eastern Pa.	20.00	20.00	20.00	25.00
Basic, Valley furnace	19.00	19.00	19.00	25.00
Valley Bessemer del. P'gh.	21.76	21.76	21.76	28.26
Malleable, Chicago*	20.50	20.50	20.50	27.00
Malleable, Valley	20.00	20.00	19.00	24.50
Gray forge, Pittsburgh	21.26	21.26	20.26	25.76
L. S. charcoal, Chicago	29.04	29.04	29.04	32.15
Ferromanganese, furnace	95.00	95.00	99.00	112.50
Rails, Billets, Etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Bess. billets, Pittsburgh	37.00	37.00	38.00	42.50
O.-h. billets, Pittsburgh	37.00	37.00	38.00	42.50
O.-h. sheet bars, P'gh.	37.50	37.50	38.00	42.50
Forging billets, base, P'gh.	42.00	42.00	43.00	47.50
O.-h. billets, Phila.	42.17	42.17	43.17	47.67
Wire rods, Pittsburgh	46.00	46.00	46.00	51.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.00	2.00	2.00	2.40
Light rails at mill	1.85	1.85	1.85	2.15
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.32	2.32	2.42	2.67
Iron bars, Chicago	2.15	2.15	2.20	2.40
Steel bars, Pittsburgh	2.10	2.10	2.15	2.40
Steel bars, Chicago	*2.00*	2.10	2.15	2.50
Steel bars, New York	2.44	2.44	2.49	2.74
Tank plates, Pittsburgh	*1.80*	1.90	2.00	2.50
Tank plates, Chicago	2.10	2.10	2.25	2.60
Tank plates, New York	*1.99*	2.09	2.09	2.84
Beams, Pittsburgh	2.00	2.00	2.00	2.50
Beams, Chicago	2.10	2.10	2.25	2.60
Beams, New York	2.34	2.34	2.34	2.84
Steel hoops, Pittsburgh	2.60	2.60	2.60	3.15

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	Sept. 9, 1924	Sept. 2, 1924	Aug. 12, 1924	Sept. 11, 1923
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	3.50	3.50	3.40	3.75
Sheets, galv., No. 28, P'gh.	4.60	4.60	4.50	5.00
Sheets, blue an'l'd, 9 & 10	2.70	2.65	2.60	3.00
Wire nails, Pittsburgh	2.80	2.80	2.80	3.00
Plain wire, Pittsburgh	2.55	2.55	2.55	2.75
Barbed wire, galv., P'gh.	3.50	3.50	3.50	3.80
Tin plate, 100-lb. box, P'gh.	$5.50	$5.50	$5.50	$5.50
Old Material, Per Gross Ton:				
Carwheels, Chicago	$18.00	$18.00	$17.00	$20.00
Carwheels, Philadelphia	18.00	18.00	17.50	21.00
Heavy steel scrap, P'gh.	17.50	17.50	17.50	18.00
Heavy steel scrap, Phila.	17.00	17.00	17.00	17.00
Heavy steel scrap, Ch'go	16.50	16.00	15.50	16.50
No. 1 cast, Pittsburgh	18.00	18.00	18.00	22.00
No. 1 cast, Philadelphia	18.00	18.00	17.00	21.50
No. 1 cast, Ch'go (net ton)	18.50	17.50	17.50	20.00
No. 1 RR. wrot. Phila.	19.00	19.00	18.00	19.00
No. 1 RR. wrot. Ch'go (net)	15.00	14.00	13.75	16.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$3.00	$3.00	$3.00	$4.50
Foundry coke, prompt	4.00	4.00	4.00	5.75
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*13.50*	13.75	13.75⅛	14.12½
Electrolytic copper, refinery	*13.12½*	13.25	13.37½	13.62½
Zinc, St. Louis	*6.15*	6.30	6.17½	6.55
Zinc, New York	*6.50*	6.65	6.52½	6.90
Lead, St. Louis	*7.95*	8.00	7.60	6.72½
Lead, New York	*8.10*	8.25	7.87½	7.00
Tin (Straits), New York	*51.12½*	53.37½	51.62½	42.12½
Antimony (Asiatic), N. Y.	11.00	10.25	9.12½	7.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market report on other pages.

THE IRON AGE Composite Prices

Sept. 9, 1924, Finished Steel, 2.496c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 88 per cent of the United States output of finished steel.

Sept. 2, 1924,	2.510c.
Aug. 12, 1924,	2.517c.
Sept. 11, 1923,	2.775c.
10-year pre-war average,	1.689c.

Sept. 9, 1924, Pig Iron, $19.46 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.

Sept. 2, 1924,	$19.46
Aug. 12, 1924,	19.38
Sept. 11, 1923,	25.29
10-year pre-war average,	15.72

1924 to Date				1923	
High		Low		High	Low
2.789c., Jan. 15	2.496c., Sept. 9		Finished Steel	2.824c., April 24	2.446c., Jan. 2
$22.88, Feb. 26	$19.29, July 8		Pig Iron	$30.86, March 20	$20.77, Nov. 20

dential election appears to be a factor in the market, and the possibility of an election by Congress is feared in some quarters.

The Steel Corporation has until Sept. 22 to make reply to the "cease and desist" order of the Federal Trade Commission, and there is a growing belief that the corporation will decide not to combat that order. For some time it has been quoting delivered prices on a number of its lines and prepaying freight from mill to destination. A report that it would set up a Chicago base on sheets, although not confirmed, is translated by some as meaning that the corporation will go along with the order. This is disturbing to the independent companies. As few of them have plants in more than one district, they cannot ship very far from their particular locations in either direction without loss.

The automobile industry seems to be steadily increasing its production schedules and demand for steel from that source is heavier this month than it was in August. Distribution of 10,000 steel box cars by the Pennsylvania Railroad creates some optimism as to fall railroad business, although this particular order, so far as steel is concerned, benefits the Steel Corporation principally. Higher farm products prices have not yet been reflected back to steel purchases in this district.

It has been an extremely quiet week in pig iron and higher asking prices on foundry grade are maintained with difficulty since supplies appear ample for current demands. This market does not share the strength and

activity of other markets on scrap iron and steel The firmer tendency recently observed in the coal and coke market has not held.

Pig Iron.—Business has gone flat in this district lately, with important sales entirely lacking and no new inquiries of any consequence. A Valley furnace interest sold 1000 tons of No. 2 foundry for shipment to northeastern Pennsylvania over the last quarter of the year at $20, furnace, but the buyer bought on brand and the inquiry was not general. Otherwise, sales not only of foundry grade but all others have rarely involved more than a carload. We make no change in prices, but the market is weak at $20 for No. 2 foundry and offers to obtain higher prices for steel making grades have not been successful. The furnace of the Perry Iron Co. at Erie, Pa., has been blown in after a six months shut down.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.76 per gross ton:

Basic	$19.00 to $20.00
Bessemer	20.00 to 21.00
Gray forge	19.50
No. 2 foundry	20.00
No. 3 foundry	19.50
Malleable	20.00
Low phosphorus, copper free	27.00 to 28.00

Ferroalloys.—Both American and British makers of ferromanganese are quoting $95, Atlantic seaboard, but it is more of an asking than a selling price, since important consumers very generally covered their requirements at lower prices and current demands are not of sufficient size to provide a real test of the price now quoted. No offerings are being made at less than $95, but so far as this district is concerned there are no recent sales upon which to base that price. There have been suggestions that recent sales of British material at $92.50, duty paid, were below the prices at which British makers were selling in the British market, but if this is the case, the wonder is that American producers have not evoked the law against "dumping." One maker of 50 per cent ferrosilicon still is quoting $72, delivered, but those representing the major portion of active capacity are quoting $74 to $75; there is not much new business and it is a question which is the prevailing figure. Specifications are fairly good against contracts for spiegeleisen, but new demands are few and small. Prices of domestic material are unchanged. Prices are given on page 667.

Semi-Finished Steel.—There is not enough open market business to clearly establish prices. Non-integrated mills are generally protected by contracts and demand for finished products are not heavy enough to force purchases beyond the contract shipments. Specifications against contracts are being accepted by makers at $37 to $38, Pittsburgh or Youngstown, for billets and slabs and at $37.50 to $38 for sheet bars, but shipments against contracts are not heavy enough to provide all mills with economical schedules and buyers who could provide a fair-sized order for early shipment would have no trouble in placing it at the lower figures. Fair demand is noted for wire rods and on the bulk of current sales, which are mostly of small lots, $46, base, is the ruling price. The chief activity in skelp seems to be in replacing the product of strip mills rather than for pipe. There are no big demands for skelp from the small pipe makers or those making boiler tubes. Ingot production in this and nearby districts still is on the increase, but it is not at the high rate indicated by the reports of the number of units engaged, which would suggest an output up around 75 per cent of capacity. Few steel making units are being forced and production is probably right around 60 per cent of capacity, as some plants are not yet able to maintain the same rate from the beginning to the end of the week. Some that are doing so admit accumulation. To produce more steel than is required by orders has the saving virtue of keeping down costs to some extent. Prices are given on page 667.

Wire Products.—Demand at least is holding the improvement recently made, but claims of increases in the orders are lacking this week. It is too soon for the market to feel the effect of the higher prices for grain and farm products in the shape of larger orders for fence and fence material and demand for other lines is largely for nearby requirements. Accumulation of backlog business is difficult and with the mills still making very prompt deliveries, jobbers and consumers have no incentive to anticipate wants. While there are some deviations from quotations in some districts, they are not so frequent as they were a short time ago and the market appears fairly steady at $2.80, base, per keg of nails and $2.55, base, per 100 lb. for plain wire. Prices are given on page 666.

Plates.—Recent distribution of the 10,000 box car order by the Pennsylvania Railroad is not particularly helpful to the plate situation, because practically all of the steel will be furnished by Steel Corporation subsidiaries. Outside of this business there are no big plate inquiries before the market and desire for orders is still keen enough to keep prices in buyers' favor. On inquiries involving more than a carload, 1.90c., Pittsburgh, is easily done. Prices are given on page 666.

Bolts, Nuts and Rivets.—Intimations of higher bolt and nut prices have been sustained by an advance of about 10 per cent, announced by leading local makers, effective Sept. 4. Cut thread machine bolts now are quoted at 60 and 10 off list and hot-pressed nuts at 4.50c. off list for squares and 5c. off list for hexagons. Semi-finished nuts, United States Standard, have been cut 10 per cent in the new schedule, which is to apply both on prompt and fourth quarter business. All makers still have some unspecified business taken at or below the old prices, but the latest advance should make solid the business taken before it was made. Rivet prices are unchanged in the new schedule at $2.60 base for heavy rivets and 70, 10 and 5 per cent off list for the small ones. Sales of large rivets still are noted as low as $2.50 base. Prices and discounts are given on page 666.

Steel Rails.—No really large demands are coming out in this district for light rails and on such business as is being booked the ruling prices are 1.85c. to 1.90c., base, for billet rails. Large lots have sold at lower prices in outside districts, but it is asserted that the size of the order and the fact that it was attractive from a small standpoint made it a special case. Prices are given on page 666.

Tubular Goods.—Market characteristics are much as they have been in the past few weeks. Steady gain still is reported in the orders for merchant pipe and large orders placed a short time ago for line pipe are being supplemented with numerous small ones. Oil well pipe still is the quiet spot in the trading. General business is not yet sufficient to engage capacity more than 75 per cent and there is some increasing of mill stocks even at that rate. Mill deliveries are so prompt and there being no indication of higher prices in the near future, the incentive to large forward buying is lacking. The boiler tube situation is still very badly unsettled as to prices; sellers are much more numerous than buyers and prices reflect sharply that condition. Sales prices are far below those indicated by card discounts. Discounts are given on page 666.

Sheets.—Business has not gained further in the past week, but it is at least up to the rate of last week and the week before. The American Sheet & Tin Plate Co., as a result of somewhat heavier domestic specifications and liberal export orders, has increased production about 5 per cent since a week ago, but independent mill operations are somewhat lower than they have been and the general average rate of production is about 60 per cent of capacity. While lower prices have not entirely disappeared, the more common prices now are 3.50c., base, for black, either tin mill or sheet mill sizes; 4.60c., base, for galvanized; 2.70c., base, for blue annealed, and 4.75c., base (22 gage), for automobile body sheets. The automotive industry is a little freer with specifications than it was recently. Prices are given on page 666.

Tin Plate.—Demands still are sufficient to keep the industry a little more than 50 per cent engaged. It looks as though the pack of perishable foods would be well up to the average of last year and that the heavy

production of packer can sizes of the first half of this year would be fully absorbed. Few makers have very substantial backlog tonnages to work on and good delivery is being made against strictly new business. The Texas Co., which recently inquired for 100,000 boxes of oil can sizes, is reported to have divided the order between an Eastern and a West Virginia maker. There are no important deviations from the quoted price of $5.50, per base box, Pittsburgh, on domestic business.

Cold-Finished Steel Bars and Shafting.—Business is not up to the expectations of some producers, but, as measured by shipments, it is much better than it was in August. The best demand still is from the automobile parts makers. With the industry not much more than 50 per cent engaged, it is commented upon that there is surprisingly little cutting of the price of 2.80c., base, Pittsburgh, and that the recent weakness in hot-rolled bars does not appear to be having much effect on the cold-finished bar price. Ground shafting still is priced at 3.20c., base, f.o.b. mill, for carload lots.

Hot-Rolled Flats.—Business is gaining with makers in this district, but prices are not yet showing any considerable firmness. On wide stock competition for business still is sharp enough to keep prices very largely in buyers' favor and on narrow material the top quotations are the exception rather than the rule. Southern advices point to a cotton crop of about 12,000,000 bales and a demand for ties which will use up the carryover from last year as well as this year's production. This year's price was $1.40 per bundle of 45 lb., f.o.b. Atlantic ports, for interior shipment and $1.43 out of coast warehouses. Other prices are given on page 666.

Cold-Rolled Strips.—Makers in this district still are holding to 4.25c., base, Pittsburgh, as the regular price, but find that in some districts they have to take 4c. to hold their customers. The latter price is fairly readily obtainable on sizable lots for early delivery.

Track Supplies.—The market is quiet, although recent large rail inquiries point to some big future orders for the fastenings. Recent prices are holding, but they are untested. They are given on page 666.

Iron and Steel Bars.—Contract buyers of steel bars are specifying fairly freely, but business otherwise is rather slack. A base of 2.10c. is common, even on moderate sized lots, and higher quotations are disappearing. Iron bar prices are unchanged, but as demands are light, it is probable that fair sized inquiries would develop concessions. Prices are given on page 666.

Structural Material.—Prices are relatively firm on heavy structural shapes, no quotations of less than 2c. having come out in this district. Local fabricating shops are figuring against a good many inquiries involving a fairly large amount of steel, but investors are prone to "shop" a good deal before closing. Price competition still is pretty sharp on structural jobs. Plain material prices are given on page 666.

Coal and Coke.—Recent stiffening in prices appears to have been a false start, because spot tonnages of coke again seem plenty at recent minimum prices and coal is selling for future delivery at no material advance over spot prices. Sensing an improved demand, producers were rather disposed to ask more for coal on contracts than for spot or prompt delivery, but buyers failed to respond, claiming better prices in West Virginia; while the desire for as full operation as possible led some producers to modify their price ideas. While coke is no lower than it has been, the weakness of coal is not helpful to a firm market. Spot furnace coke now is readily obtainable at $3 per net ton at ovens and seemingly no premium is obtainable, with by-product grade also to be had at $3, Connellsville base. Foundry coke ranges from $4 to $4.50, but it is reported that sales have been made for eastern shipment as low as $3.75. Mine run steam coal is quotable from $1.50 to $2 per net ton at mines, coking grade from $1.60 to $1.85 and gas coal from $2 to $2.25. Steam slack ranges from $1.20 to $1.30 and gas slack from $1.30 to $1.40.

Old Materials.—Activity still is lacking in this district except for some fair-sized sales of machine shop turnings, but prices are not entirely unaffected by the strength of the outside markets. Dealers are freely offering $18.50, Youngstown, for heavy melting steel, although the steel company named in the inquiries claims that it has not paid more than that price, which would indicate either that the dealers were taking a loss or that the company had paid more and was giving the dealers protection by not outbidding them. Dealers still are more bullish on the situation than are the mills, as witness the prices paid for the Pennsylvania Railroad scrap awarded last week: Heavy melting steel, $19.50, Youngstown, $18 eastern Pennsylvania and $17.50 Chicago; rails, $18.50, Warren, Ohio; yard scrap, $16.50 to $17.35, Canton, Ohio. Mills here continue to show only a passive interest in supplies and are taking only such lots as they can get at their own prices. Pickup tonnages of heavy melting steel are selling at $17.50 to $18, but a mill that wanted a round tonnage could not do that well by at least $1 a ton. Compressed sheet scrap is at less of a discount from heavy steel scrap than it has been and dealers who sold turnings and boring at $15 are finding it hard to cover for less. The Norfolk & Western Railroad will receive bids until noon Sept. 17 on 4185 gross tons of iron and steel scrap.

We quote for delivery to consumers' mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

	Per Gross Ton	
Heavy melting steel	$17.50 to	$18.00
No. 1 cast, cupola size	18.00 to	18.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	18.50 to	19.50
Compressed sheet steel	16.50 to	17.00
Bundled sheets, sides and ends	15.00 to	15.50
Railroad knuckles and couplers	20.00 to	20.50
Railroad coil and leaf spring	20.00 to	20.50
Low phosphorus blooms and billet ends	22.00 to	22.50
Low phosphorus plate and other material	21.00 to	21.50
Railroad malleable	16.00 to	16.50
Steel car axles	20.00 to	20.50
Cast iron wheels	17.50 to	18.00
Rolled steel wheels	20.00 to	20.50
Machine shop turnings	14.50 to	15.00
Sheet bar crops	18.50 to	19.00
Heavy steel axle turnings	15.50 to	16.00
Short shoveling turnings		15.00
Heavy breakable cast	16.00 to	16.50
Stove plate	14.00 to	14.50
Cast iron borings		15.00
No. 1 railroad wrought	15.00 to	15.50
No. 2 railroad wrought	17.50 to	18.00

Will Continue Fight Against Pittsburgh Plus, if Necessary

CHICAGO, Sept. 8.—The fight against Pittsburgh plus will not be relaxed until the practice has finally been abolished, was the decision reached by the executive committee of the Associated States Opposing Pittsburgh Plus at a meeting held at Hotel La Salle, Chicago, Sept. 6.

"The United States Steel Corporation has until Sept. 21 to perfect its appeal," said B. F. Baker, Kewanee, Ill., chairman of the committee, "but we do not expect an appeal because the Trade Commission's ruling is without question one of the most popular ever rendered by a judicial body in this country."

In a recent issue of the *Bethlehem Review*, a bulletin of news for the employees of the Bethlehem Steel Corporation, it is stated that in the years 1914-1920 inclusive $237,000,000 was expended by the Bethlehem Steel Corporation for additions and improvements. In the years since 1920 like expenditures have been $42,000,000, and it is estimated that additions and other work under way at the Lackawanna and Midvale properties acquired by Bethlehem will represent $30,000,000 additional.

The American Wire Fabrics Corporation, Mount Wolf, Pa., has increased operations to a full time basis, working 10 hr. per day, 5½ days per week. Heretofore the plant has been running on a 9-hr. day schedule, 5 days per week.

Chicago

Steady Improvement in Finished Steel Continues—Some Price Weakness

CHICAGO, Sept. 9.—The first week in September carried forward the steady improvement in finished steel business which had its inception in the month of August. For a leading mill, new commitments, as well as orders passed to entry, were the heaviest since April, not counting 50,000 tons booked too late to be included in the records for the week. The August increase over July, according to final computations, shows a gain of 24 per cent in new business and 28 per cent in tonnage specified for rolling.

Demand is not only gathering momentum, but it is well diversified, coming from practically all classes of consumers. Buying of bars is particularly active, but this is not surprising in view of the well nigh universal use of that commodity. From the standpoint of tonnage, current orders from the railroads stand out most prominently. The Texas & Pacific has placed 10,000 tons of rails with the Tennessee Coal, Iron & Railroad Co. and 9000 tons with the Bethlehem Steel Co. Inquiries for track supplies are more numerous, including 1000 tons of tie plates each wanted by the Pere Marquette and the Chesapeake & Ohio respectively and 1500 tons of angle bars, 1000 tons of spikes and 500 tons of bolts asked for by the Northern Pacific. New railroad car purchases embrace 10,000 box cars ordered by the Pennsylvania and 2000 placed by the Texas & Pacific. In addition, the Illinois Central will probably close this week against its inquiry for 6400 freight cars, while the St. Louis-San Francisco is entering the market for 5000 cars and the New York Central and the Baltimore & Ohio contemplate putting out large inquiries, the latter road for hopper cars. Oil storage tank construction continues to bring tonnage to the mills, one local producer having booked 5000 tons of plates for tank work during the week. Structural awards are in good volume, with the placement of a number of large pending projects imminent.

The price situation, however, is still flexible, and soft steel bars have definitely declined, now being available in large lots at 2c., Chicago.

The general trend of production is in the direction of improvement, although there is still a wide variance between the operating rate of different mills. One important interest is running at between 65 and 70 per cent of capacity, while another mill is now on a 45 per cent basis. Fifteen blast furnaces are active out of 34 steel works stacks in the district, but an additional Gary furnace is expected to blow in this week.

Pig Iron.—Buying continues at a conservative rate, but specifications against contract are liberal, reflecting improved foundry operations. It is especially notable that automotive foundries are releasing shipments against malleable iron on which they had suspended deliveries several months ago. Inasmuch as malleable represents a considerable proportion of the stocks still remaining on furnace yards, this new development may make it again necessary to add to the active merchant capacity in this district. While the present attention of melters is focused on shipments, the trade is convinced that additional orders will have to be placed for fourth quarter, notably by the automobile foundries, jobbing plants and melters serving the railroad equipment industry. Recent large purchases of freight cars will mean heavy orders for castings as well as car wheels. A railroad equipment maker, in fact, has entered the market for 2000 tons of foundry. Other current inquiries range from 500 tons down to carload lots. A Michigan stove manufacturer, for example, is inquiring for 500 tons of foundry. Singularly there have been few sales of any size. Perhaps the largest was 600 tons of foundry for fourth quarter, which went to a local melter. A local furnace has advanced prices 50c. a ton to $21, base, but this action has not yet been followed by other makers and no sales have thus far been reported at the new quotation. A local melter has closed for 100 tons of charcoal for fourth quarter. A western Illinois consumer is in the market for a carload of 9 per cent silvery.

Quotations on Northern foundry, high phosphorus, malleable and basic iron are f.o.b. local furnaces and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards.

Northern No. 2 foundry, sil. 1.75 to 2.25	$20.50
Northern No. 1 foundry, sil. 2.25 to 2.75	21.00
Malleable, not over 2.25 sil.	20.50
Basic	20.50
High phosphorus	20.50
Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	29.04
Southern No. 2 (barge and rail)	22.18
Southern No. 2, sil. 1.75 to 2.25	$23.51 to 24.01
Low phos., sil. 1 to 2 per cent, copper free	31.70
Silvery, sil. 8 per cent	34.29 to 35.29
Electric ferrosilicon, 14 to 16 per cent	43.42

Ferroalloys.—The market is dull, with the price situation unchanged.

We quote 80 per cent ferromanganese, $102.56, delivered; 50 per cent ferrosilicon, $75, delivered; spiegeleisen, 18 to 22 per cent, $40.56, delivered.

Plates.—Demand shows steady improvement as the railroad car buying program gains headway. A local independent will supply 15,000 tons of steel for 1000 gondola car bodies recently placed with a Richmond car builder by the Chesapeake & Ohio. The Texas & Pacific has bought 2000 automobile cars, dividing them equally between the Pullman Co. and the American Car & Foundry Co. The Pennsylvania has closed for 10,000 automobile and box cars, but so far as can be learned at present writing the necessary steel will be placed with mills east of here. Activity in oil storage tanks also shows some betterment. The Marland Refining Co. has awarded 10 tanks, involving 3000 tons, to the Chicago Bridge & Iron Works. A local mill has booked 5000 tons of plate for tank work during the past week. While plate business is increasing, keen competition is the rule and prices are no stronger.

The mill quotation is 2.10c. to 2.15c., Chicago. Jobbers quote 3.10c. for plates out of stock.

Structural Material.—Fresh fabricating awards total more than 9100 tons, of which 3000 tons was for oil storage tanks. New inquiries are light, but a number of large pending tonnages are expected to be placed early this week. The Morrison Hotel annex and the Eitel Brothers' building, both local projects, will require 7000 tons each. The Standard Club building, Chicago, involves 3000 tons. Plain material prices are still flexible, although they have not definitely declined.

The mill quotation on plain material is 2.10c. to 2.15c., Chicago. Jobbers quote 3.10c. for plain material out of warehouse.

Bars.—Demand for soft steel bars is better than for most other forms of finished products and buying is distributed among all classes of consumers. Bolt and screw manufacturers have placed liberal orders for September, the bookings of one important mill for that class of customers amounting to more than 13,000 tons. Farm implement makers are steadily increasing their commitments as the result of better business both here and abroad, particularly in Russia and South America. One implement manufacturer has taken a liberal order for gang plows for Russian delivery. Mills rolling alloy steel bars report that August was the best month in business booked since March. This would indicate that the revival of activity in the automotive trade has been more extensive than generally appreciated. Quotations on soft steel bars are weaker, ranging from 2c. to 2.10c., Chicago. Prices on bar iron are unchanged, with demand lagging. New business in rail steel bars has benefited by increased demand for fence posts as well as the broadening activities of farm machinery makers. One rail steel mill finds it has too much tonnage to roll on a single turn basis, but not

enough for double turn. It expects, however, to go on double turn within a fortnight.

Mill prices are: Mild steel bars, 2c. to 2.10c.; common bar iron, 2.15c. to 2.20c., Chicago; rail steel, 2c., Chicago mill.

Jobbers quote 3c. for steel bars out of warehouse. The warehouse quotations on cold-rolled steel bars and shafting are 3.80c. for rounds and 4.30c. for flats, squares and hexagons; 4.15c. for hoops and 3.65c. for bands.

Jobbers quote hard and medium deformed steel bars at 2.20c. to 2.30c.

Sheets.—Prices are weak, although mill bookings are heavier. A Western mill, which is now running 16 out of 28 hot mills, contemplates adding five more mills next week. Uncertainty as to what course the Steel Corporation will take regarding the decision of the Federal Trade Commission in the Pittsburgh basing point case has undoubtedly caused buyers to adhere to a conservative policy.

Mill quotations are 3.50c. for No. 28 black, 2.70c. for No. 10 blue annealed, and 4.60c. for No. 28 galvanized, all being Pittsburgh prices subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote f.o.b. Chicago: 3.80c. for blue annealed; 4.50c. for black, and 5.50c. for galvanized.

Wire Products.—While there is still little buying for stocks, business has improved sufficiently to warrant a general increase in mill operations, which now average 55 to 60 per cent for the industry as a whole. Increased demand from manufacturing consumers is largely responsible for increased production, inasmuch as mills do not stock so heavily in specialties as in the common products. For mill prices, see Finished Iron and Steel, f.o.b. Pittsburgh, page 666.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, $3.70 per 100 lb.; extra for black annealed wire, 15c. net 100 lb.; common wire nails, $3.55 per 100 lb.; cement coated nails, $2.80 per keg.

Rails and Track Supplies.—A number of good sized lots of track fastenings are in the market, some of them for delivery up to July 1, 1925, but it is probable that the bulk of this buying will be deferred until the railroads have worked out their rail programs for next year. No new rail inquiries are reported, but most of the large lines are expected to enter the market. Specifications against old rail contracts are heavy; in fact, the Gary mill, which resumed operations last week, finds that releases for September rolling have come in faster than it is able to take care of them.

Standard Bessemer and open-hearth rails, $43; light rails, rolled from billets, 2.10c., f.o.b. makers' mill.

Standard railroad spikes, 2.80c. to 3c. mill; track bolts with square nuts, 3.80c. to 4c. mill; steel tie plates, 2.45c., f.o.b. mill; angle bars, 2.75c. f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.45c. base, and track bolts, 4.45c. base.

Cast Iron Pipe.—James B. Clow & Sons will supply 250 tons for Kewanee, Ill., while the United States Cast Iron Pipe & Foundry Co. will furnish 750 tons each for Western Springs and Highland Park, Ill. The National Cast Iron Pipe Co. is low bidder on 400 tons for Deshler, Ohio. St. Paul takes bids today on 250 tons of 6-in. Ferndale, Mich., received revised tenders yesterday on 750 tons of 6-, 8-, 10- and 12-in. Chicago has rejected bids on 100 tons of fittings. Prices remain unchanged at $44 to $45, base, Birmingham, for 6-in. and larger.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $56.20 to $57.20; 6-in. and over, $52.20 to $53.20; Class A and gas pipe, $5 extra.

Reinforcing Bars.—The market remains exceedingly dull, with no signs of improvement in either lettings or inquiries. Bookings of orders taking less than 100 tons, which ordinarily form the bulk of dealers' business, have declined sharply. Larger commitments are also exceptional. Keen competition between distributers is reflected in the weakness of prices, which range from 2.20c. to 2.30c., Chicago warehouse. The City of Chicago will take general contract bids, Oct. 15, on the first section of its South Water Street river improvement, which will involve a total of 6500 tons.

Lettings include:

Pennsylvania Railroad, Ogden Avenue subway, 200 tons to Joseph T. Ryerson & Son.

Brockman Mfg. Co., four-story factory and warehouse, Chicago, 100 tons to Kalman Steel Co.

Knights of Columbus Club, Green Bay, Wis., 150 tons to Concrete Engineering Co.

Pending business includes:

City of Chicago, South Water Street improvement, 6500 tons, general contract bids on first section to be taken Oct. 15.

United Masonic Temple building, Chicago, 500 tons, general contract figures to be taken shortly.

Hotel Sherman Service building, Chicago, 600 tons, Krahl Construction Co., general contractor, new figures on reinforcing steel being taken.

City of Minneapolis, 311 tons, bids to be taken Sept. 11.

City of Chicago, Commissioner of Public Works, 300 tons, bids to be taken Sept. 12.

City of Eau Claire, Wis., 3,000,000-gal. reservoir, 110 tons. A. Larson & Co., Eau Claire, general contractor, taking bids.

Bolts and Nuts.—Prices have again been advanced as follows, all quotations being on a Chicago base:

Machine bolts, small, rolled threads, 60 and 10 and 10 off.

Machine bolts, all sizes, cut threads, 60 and 10 off.

Carriage bolts, small, rolled threads, 60 and 10 off.

Carriage bolts, cut threads, all sizes, 60 off.

Hot-pressed and cold-punched nuts, square or hexagon, blank or tapped, $4.50 off.

Lag screws, 70 off.

Bolt ends with hot-pressed nuts, 60 and 10 off.

Bolt ends with cold pressed nuts, 50 and 10 and 5 off.

Plow bolts, 50 and 10 and 5 off.

Large structural and ship rivets, $2.75 per 100 lb.

Small rivets, 70 and 10 off.

Bolt plant operations are improving, averaging more than 50 per cent.

Jobbers quote structural rivets, 3.65c.; boiler rivets, 3.85c.; machine bolts up to ¾ x 4 in., 60 per cent off; larger sizes, 60 off; carriage bolts up to ¾ x 6 in., 55 off; larger sizes, 55 off; hot pressed nuts, squares and hexagons, tapped, $4 off; blank nuts, $4 off; coach or lag screws, gimlet points, square head, 65 per cent off.

Old Material.—Large consumer purchases of heavy melting at prices ranging from $16.50 to $17 per gross ton delivered have given prices another upward impetus. Orders from the leading mills aggregate 7500 tons, while the foremost independent is credited with buying close to 20,000 tons. Smaller mills are now showing renewed interest in the market, and other classes of consumers are coming in for their needs. Recent railroad car buying has noticeably changed the attitude of both car wheel manufacturers and makers of steel castings. Advances in prices are general and range from 50c. to $1 a ton. Railroad offerings include the Burlington, 4000 tons; the Chicago & Eastern Illinois, 1000 tons, and the Chicago Great Western and the Belt Railway of Chicago, 500 tons each.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Iron rails	$18.00 to	$18.50
Cast iron car wheels	18.00 to	18.50
Relaying rails, 56 and 60 lb.	26.00 to	27.00
Relaying rails, 65 lb. and heavier	27.00 to	32.00
Forged steel car wheels	20.00 to	20.50
Railroad tires, charging box size	19.75 to	20.25
Railroad leaf springs, cut apart	19.75 to	20.25
Rails for rolling	17.50 to	18.00
Steel rails, less than 3 ft.	18.50 to	19.00
Heavy melting steel	16.50 to	17.00
Frogs, switches and guards cut apart	16.50 to	17.00
Shoveling steel	16.25 to	16.75
Drop forge flashings	11.50 to	12.00
Hydraulic compressed sheets	13.50 to	14.00
Axle turnings	14.00 to	14.50
Steel angle bars	18.00 to	18.50
Steel knuckles and couplers	19.75 to	20.25
Coil springs	20.50 to	21.00
Low phos. punchings	17.50 to	18.00
Machine shop turnings	10.00 to	10.50
Cast borings	11.50 to	12.25
Short shoveling turnings	11.50 to	12.25
Railroad malleable	18.50 to	19.00
Agricultural malleable	17.00 to	17.50
	Per Net Ton	
Iron angle and splice bars	18.00 to	18.50
Iron arch bars and transoms	19.00 to	19.50
Iron car axles	25.00 to	26.00
Steel car axles	19.00 to	19.50
No. 1 busheling	12.50 to	13.00
No. 2 busheling	8.50 to	9.00
Pipes and flues	11.00 to	11.50
No. 1 railroad wrought	15.00 to	15.50
No. 2 railroad wrought	14.75 to	15.25
No. 1 machinery cast	18.50 to	19.00
No. 1 railroad cast	17.00 to	17.50
No. 1 agricultural cast	17.00 to	17.50
Locomotive tires, smooth	17.00 to	17.50
Stove plate	15.50 to	16.00
Grate bars	15.00 to	15.50
Brake shoes	15.50 to	16.00

New York

Increased Inquiry for Pig Iron—Structural Bookings Show Decline

NEW YORK, Sept. 9.—Following a period of almost entire absence of buyers from the market, the pig iron market has become much more active within the past few days. Numerous inquiries for small tonnages have appeared and inquiries for round lots amounting to about 25,000 tons are on the market. The Pennsylvania Railroad is in the market for 5000 tons of foundry iron for fourth quarter, and another company whose name has not been announced is inquiring for 6000 tons. The Gould Coupler Co. wants from 1000 to 3000 tons of basic. Another inquiry is for 1500 tons. It is understood that the New England textile machinery company, which had been in the market for a few days for 3000 to 4000 tons, has purchased, but no details of the transaction are announced. Prices are unchanged. Colonial furnace, Riddlesburg, Pa., has been blown in after being idle since last May. It has no stocks on hand. Recent reports of furnace operations indicate more satisfactory shipments, but only slight reduction in stocks.

We quote delivered in the New York district as follows, having added to furnace price $2.27 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 2, sil. 1.75 to 2.25	$22.27 to $22.77
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	23.27 to 23.77
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.77 to 23.27
Buffalo, sil. 1.75 to 2.25	23.91 to 24.41
No. 2 Virginia, sil. 1.75 to 2.25	29.94 to 30.44

Ferroalloys.—Outside of an inquiry for 500 tons of ferromanganese the market is exceedingly inactive, with sales limited to a few carload and small lots. The general quotation for both the domestic and foreign alloys is $95, seaboard basis, but it is probable that a desirable order would bring some concessions, sales having been made a week or so ago as low as $90. Sales in the spiegeleisen market have also been limited to carload lots at regular quotations. New business in 50 per cent ferrosilicon is exceedingly small, but producers having contracts report more specifications on these the last month than in any three previous months, the proportion being almost double and increasing.

Cast Iron Pipe.—Another municipal inquiry has been sent out for 8- and 12-in. water pipe, in addition to those from the Boroughs of Bronx and Queens for about 1000 tons each, which are yet to be placed. The Department of Water Supply, Gas and Electricity, City of New York, is asking bids on 7000 tons to be purchased by the city direct. Demand is well sustained and prices are unchanged. Business comes in volume especially good for this time of year. Some mills are said to have from two to three months' business on the books. Private transactions, though not in large volume, are regarded as keeping a satisfactory pace at a time which often ushers in a period of quiet. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $56.60 to $57.60; 4-in. and 5-in., $61.60 to $62.60; 3-in., $71.60 to $72.60, with $5 additional for Class A and gas pipe. No change is apparent in soil pipe, either as to demand or prices. Business is in fair amount. By some makers the market is regarded as liquid; hence it would not be surprising to see prices turn to one way or the other with the first impetus. We quote discounts of both Southern and Northern makers, f.o.b. New York, as follows: 6-in., 45 to 46¼ per cent off list; heavy, 55 to 56¼ per cent off list.

Warehouse Business.—Gradually increased activity in most products has prevailed since Labor Day. Prices are firm and appear to be settling around the adjusted levels of a few weeks ago. Buyers evince more confidence in conditions and some dealers look for business in good volume at least until November. Inquiries are no more numerous, but are for larger quantities, especially in bars, hoops and bands. Structural material demand is fair and the chief exception is black sheets, in which there is little interest. Galvanized sheets are in moderate demand. There is little change in the position of spring steel and wrought iron pipe, either in point of activity or in quotations.

Finished Iron and Steel.—Although mill representatives hear through their general sales headquarters of a gain in orders for steel in other sections of the country, the volume of buying in the New York territory has shown no material gain so far this month over the last week or two of August. Structural work, which for some time has been the main support of steel business in the New York district, has fallen off considerably both as to awards and inquiries, and other products have not shown sufficient gains to take up this slack. It is known that considerable construction work is in the hands of architects, but comparatively little has come out for bids since the first of this month. Fabricating shops, however, are quite busy, most of them having two months' work, and a few are booked ahead for several months. Prices on fabricated steel are easy, there still being considerable competition for such jobs as are in the market. Finished steel prices do not gain in strength, and in some particulars the price fabric is weaker, this being especially true of plates and concrete reinforcing bars. Plates have been sold at as low as 1.60c., Pittsburgh basis, by Eastern mills, though 1.65c is probably nearer the average of prices obtained on orders placed during the past week. Concrete reinforcing bars are weak at 2.10c., Pittsburgh, with mills making an effort to hold at this price. The recent decision of one large bar producer to establish a differential in favor of the buyer on bar-size angles has resulted in the adoption of the same price by other mills. With soft steel bars at 2.10c., bar-size angles are being sold at 2c. Whether all mills making angles will meet this latter price is not yet apparent. Revival of car buying by the railroads is looked for, the orders of the Pennsylvania Railroad for 10,000 all-steel cars, requiring upward of 100,000 tons of steel, being the first important move in what car builders expect will develop into a substantial buying movement. The Reading is inquiring for 3000 all-steel cars and the Texas & Pacific has bought 2000 automobile box cars. Steel for 2500 cars is reported to have been purchased by the purchasing department of the American Car & Foundry Co. in New York. The Texas Co. is said to have purchased the 100,000 boxes of tin plate for which it recently inquired. Aside from these items the market is devoid of projects of large size, and general buying consists mostly of moderate size lots.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.44c. to 2.49c.; plates, 1.99c. to 2.04c.; structural shapes, 2.34c. to 2.44c.; bar iron, 2.34c. to 2.44c.

Coke.—The market is somewhat more active. Standard foundry is quotable at $4.25 to $5 per ton for prompt shipment and standard furnace at $3.25 to $3.50. By-product is unchanged at $10.41, Newark and Jersey City.

Old Material.—Fair sales of steel scrap were made in the past week to eastern Pennsylvania steel plants, but the market, as reflected by prices offered by brokers to cover on orders in hand, is slightly easier. Not more than $16.50, delivered, is being offered by any of the brokers. Prices paid by local foundries for cast scrap are slightly higher, being about 50c. a ton above the quotations published a week ago.

Buying prices per gross ton New York follow:

Heavy melting steel, yard	$13.00 to $13.50
Heavy melting steel, railroad or equivalent	14.00 to 14.50
Rails for rolling	14.50 to 15.00
Relaying rails, nominal	24.00 to 25.00
Steel car axles	17.50 to 18.50
Iron car axles	26.00 to 28.00
No. 1 railroad wrought	14.50 to 15.00
Forge fire	10.00 to 10.50
No. 1 yard wrought, long	13.50 to 14.00
Cast borings (clean)	9.50 to 10.00
Machine shop turnings	9.50 to 10.00
Mixed borings and turnings	8.50 to 9.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	12.25 to 12.75
Stove plate	11.50 to 12.00
Locomotive grate bars	11.50 to 12.50
Malleable cast (railroad)	14.00 to 14.50
Cast iron car wheels	14.50 to 15.00
No. 1 heavy breakable cast	12.50 to 13.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	$15.50 to $16.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	13.50 to 14.00
No. 2 cast (radiators, cast boilers, etc.)	12.50 to 13.00

Buffalo

Recent Pig Iron Purchase by a Radiator Company Becomes Known

Pig Iron.—The market continues to lag with inquiry and orders limited. The total inquiry for the week is between 5000 and 10,000 tons, with a 1500-ton malleable inquiry from the district a feature. This lot was taken by a local maker, who booked a total of 3000 or 4000 tons as its share of the business. From New England came two sizable inquiries, one for 2000 tons of 2.25 to 2.75 silicon and another for 1000 tons of 2.75 to 3.25 silicon foundry, both for fourth quarter delivery. Inquiries for the week include one for 500 tons from this district; two for 300 tons and others for lesser tonnages. Information is now at hand regarding a recent purchase by the American Radiator Co. In all 32,000 tons was bought, sufficient to last several of this interest's plants for the remainder of the year. The American Radiator's subsidiary, the Tonawanda Iron Corporation, expects to blow in on its remodeled furnace, about Oct. 15, and produce foundry iron shortly afterward. The going price for No. 2 plain, 1.75 to 2.25 silicon, is $19.50. One furnace interest remains out of the market and the $19.50 price would be fairly firm, except for the disposition of one maker having a considerable stock of iron piled, to cut under this occasionally. It is believed that 2.25 to 2.75 silicon has been sold during the past week by this maker for less than $19.50. The other producers appear to be firm in their demand for $19.50, base, with the differentials applying.

We quote prices f.o.b. gross ton, Buffalo, as follows:

No. 2 plain, silicon, 1.75 to 2.25	$19.50
No. 1 foundry, sil. 2.75 to 3.25	$20.50 to 21.00
No. 2 foundry, sil. 2.25 to 2.75	19.50 to 20.00
Malleable, sil, up to 2.25	19.50
Lake Superior charcoal	29.28

Finished Material.—The market for finished iron and steel is gradually improving, but progress is slow. Fabricators, as last week, report improved business or at least a continuation of the last week ratio. One of the better jobs taken during the week was a 250-ton lot for a building for the Fraternal Order of Eagles. The price on bars is pretty generally 2.10c. on good-sized lots. The going sheet price is 3.50c. for black with possibility of 3.40c. One of the larger inquiries of the week was for 400 to 500 tons of black sheets. In reinforcing bars an inquiry for 300 tons for the pumping station of the local filtration plant is the feature.

Steel bars, 3.30c.; iron bars, 3.35c.; reinforcing bars, 3.30c.; structural shapes, 3.40c.; plates, 3.40c.; No. 10 blue sheets, 4.05c.; No. 28 black sheets, 4.75c.; No. 28 galvanized sheets, 5.85c.; bands, 4.05c.; hoops, 4.40c.; cold finished rounds, 4.20c.; cold-finished shapes, 4.70c.

Old Material.—Dealers are taking a very optimistic view of the market, and despite the fact that mills to date have shown little disposition to purchase, many dealers believe the large consumers of scrap will come into the market within a week. The present market has been made fairly active by transactions of dealers, but tonnage buying by the mills has been absent. The filling of old orders has led at least one Buffalo dealer to pay as high as $18 for No. 1 heavy melting steel, but the purchasing agent of a leading mill interest here states that this mill will not pay any more than $16.50 at this time. Some additional open-hearth operation has been instituted, but business has not picked up to the extent that mills are scurrying to cover their raw material requirements. One mill is not using as much scrap as normally and this is keeping its stock pile from diminishing quickly. September operation, unless some unforeseen spurt takes place, will rank along with August, most mill authorities declare. Nevertheless, the scrap supply in the district is not large and most of the railroad steel has been going outside. Recent lists from this territory brought $18.80, Youngstown. There is a better feeling in the cast and car wheels market.

We quote f.o.b. gross ton, Buffalo, as follows:

Heavy melting steel	$17.00 to $18.00
Low phosphorus, 0.04 and under	19.50 to 20.00
No. 1 railroad wrought	15.50 to 16.00
Car wheels	16.00 to 16.50
Machine shop turnings	11.50 to 12.50
Cast iron borings	12.00 to 12.50
No. 1 busheling	15.50 to 16.00
Stove plate	16.00 to 16.50
Grate bars	15.00 to 15.50
Bundled sheets	12.50 to 13.00
Hydraulic compressed	15.50 to 16.50
Railroad malleable	17.50 to 18.50
No. 1 machinery cast	17.50 to 18.00

Birmingham

Heavy Shipments of Cast Iron Pipe to California and Porto Rico

BIRMINGHAM, ALA., Sept. 9.—While three furnace companies of this district have sold iron for delivery into the fourth quarter, no change in actual conditions is boasted of and buying for future needs has not set in. Two of the smaller interests report no bookings for the last three months, preferring to wait a while until quotations show firmness. Sales made during the past week were mainly on an $18 per ton base, No. 2 foundry. Local consumers still resort to the hand-to-mouth fashion in buying except now and then a round tonnage is purchased, delivery to start at once and extend over several weeks. Local melt shows slight improvement. Furnace interests admit that a little iron has found its way again to the surplus stock. Foundries and machine shops are beginning to feel a little improvement in their general conditions. The Hardie-Tynes Mfg. Co., whose foundry and machine shops suffered a serious conflagration recently, is handling its contracts nicely, arrangements having been made with other foundries and machine shops and its own foundry and pattern shop being in operation.

We quote per gross ton, f.o.b. Birmingham district furnace as follows:

No. 2 foundry, 1.75 to 2.25 sil.	$17.50 to $18.00
No. 1 foundry, 2.25 to 2.75 sil.	18.00 to 18.50
Basic	18.50 to 19.00
Charcoal, warm blast	30.00 to 31.00

Cast Iron Pipe.—Shipments of cast iron pipe, both the large sized pressure as well as the sanitary pipe and fittings, in train loads from this district are attracting attention, as are the steady shipments in smaller tonnages. Two train loads of more than 1100 tons of large sized pipe left one of the Anniston shops the past week for California points, the shipment being via Mobile and then by ship through the Panama Canal. The other shipment was 1185 tons of Universal pressure pipe from the shops of the Central Foundry Co., at Bessemer, 12 miles from Birmingham, to Jacksonville, Fla., to be exported to Porto Rico, the shipment being made in 50 new steel gondola cars manufactured at Fairfield, a short distance from Bessemer, by the Tennessee Coal, Iron & Railroad Co. for the Southern Railway. Very few of the soil pipe shops of this district are without some business for future delivery and lettings for gas and water pipe have continued coming in and conditions in this particular direction are satisfactory, with operations very active. Cast iron pipe quotations show no change.

Steel.—Steady operations and improved shipments of various shapes of steel are the features of the steel situation for the week here. The Gulf States Steel Co. continues 50 per cent operation in the open-hearth furnace department and somewhat better in the finished mills. The Tennessee Coal, Iron & Railroad Co. mills are holding the pace heretofore noted. Steel bars, soft, are quoted at 2.25c., Birmingham.

Coke.—The coke market shows a slightly better feeling this week, though demand is not more active nor have quotations changed. By-product foundry coke is bringing $5 to $5.25, while furnace coke is quoted at $4.50 to $5 and beehive coke is holding a $5 to $5.25 per ton price.

Scrap.—Better sentiment is reported in the scrap iron and steel market in the Birmingham district and there is a little more activity in movements, though no large contracts are announced. Quotations remained steady during the past week. No. 1 cast showed a little activity, but heavy melting steel and steel rails were most talked of. Rerolling rails are finding some demand, as the little rolling mill producing concrete steel bars continues in active operation and is finding a good market for its product.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Cast iron borings, chemical	$15.00 to $16.00
Heavy melting steel	12.50 to 13.00
Railroad wrought	12.00 to 13.00
Steel axles	17.00 to 18.00
Iron axles	19.00 to 19.50
Steel rails	12.50 to 13.00
No. 1 cast	15.00 to 16.00
Tram car wheels	15.00 to 16.00
Car wheels	14.00 to 15.00
Stove plate	14.00 to 15.00
Machine shop turnings	6.00 to 7.00
Cast iron borings	7.00 to 8.00
Rails for rolling	15.00 to 16.00

St. Louis

Pig Iron Market Very Dull—Old Material Prices Advance

ST. LOUIS, Sept. 9.—Buying of pig iron during the last week was extremely light, and there are no inquiries to speak of before the market. Melters in the district seem to have sufficient material to take care of orders now booked and are not disposed to take on additional tonnages. Makers feel that there will be an advance in prices, and they are making no special effort to get business. Despite the lull that has existed for the last few weeks in this district, the market continues firm. The principal inquiry is for 350 tons of foundry grades for an Iowa melter, and an Illinois melter wants 225 tons of foundry iron. The market for Northern iron is at $20.50, Chicago; Southern, $17.50 to $18, Birmingham, and the St. Louis Coke & Iron Co. is quoting $21.50 to $22, Birmingham.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.16 freight from Chicago, $3.28 from Florence and Sheffield (rail and water), $5.17 from Birmingham, all rail, and 81c. average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25	$22.16
Northern malleable, sil. 1.75 to 2.25	22.16
Basic	22.16
Southern fdy., sil. 1.75 to 2.25 (rail)	$22.67 to 23.17
Southern fdy., sil. 1.75 to 2.25 (rail and water)	20.78 to 21.28
Granite City iron, sil. 1.75 to 2.25	22.31 to 22.81

Finished Iron and Steel.—A demand for sheets, the market for which has been dead for some time, has begun to develop, but it is reported that the mills which need the business most are shading prices to get it. Improvement is reported in other lines, but buying continues along conservative lines. Conditions in the Oklahoma oil fields are quiet, and little business is coming from there. Railroad buying is light.

For stock out of warehouse we quote: Soft steel bars, 3.35c. per lb.; iron bars, 3.35c.; structural shapes, 3.45c.; tank plates, 3.45c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold-rolled one pass, 5c.; cold rolled rounds, shafting and screw stock, 4.15c.; structural rivets, 3.90c.; boiler rivets, 4.10c.; tank rivets, $\frac{7}{16}$-in. and smaller, 60 per cent off list; machine bolts, 55 and 5 per cent; carriage bolts, 40 and 5 per cent; lag screws, 60 and 5 per cent; hot pressed nuts, squares or hexagons, blank or tapped, $3.50 off list.

Coke.—Dullness, which has marked the coke situation for several weeks past, continues. The demand for foundry coke is very light, and the expected movement in domestic grades has not yet materialized. Dealers are showing very little interest in their requirements for fall.

Old Material.—The market for old material is very strong, and further advances were recorded in most items during the last week. A consumer in the district bought 10,000 tons of melting steel and rails, and other users are dickering with dealers for heavy tonnages, with the prospects of closing contracts soon. Thus it seems that the consumers have been unable to hold out longer against the dealers. Stocks in hands of dealers are said to be light, and railroad offerings are light. New lists include: Union Pacific Railroad, 1600 tons; Chicago & Eastern Illinois, 1000 tons, and Belt Railway of Chicago, 500 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	$16.50 to $17.00
Rails for rolling	18.00 to 18.50
Steel rails less than 3 ft.	19.00 to 19.50
Relaying rails, 60 lb. and under	25.00 to 26.00
Relaying rails, 70 lb. and over	32.50 to 33.50
Cast iron car wheels	17.50 to 18.00
Heavy melting steel	15.50 to 16.00
Heavy shoveling steel	15.25 to 15.75
Frogs, switches and guards cut apart	17.50 to 18.00
Railroad springs	21.00 to 21.50
Heavy axles and tire turnings	12.50 to 13.00
No. 1 locomotive tires	17.00 to 17.50
Per Net Ton	
Steel angle bars	16.00 to 16.50
Steel car axles	19.50 to 20.00
Iron car axles	24.00 to 24.50
Wrought iron bars and transoms	18.25 to 18.75
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
Cast iron borings	12.00 to 12.50
No. 1 busheling	12.50 to 13.50
No. 1 railroad cast	17.50 to 18.00
No. 1 machinery cast	18.00 to 18.50
Railroad malleable	14.00 to 14.50
Machine shop turnings	7.50 to 8.00
Champion bundled sheets	8.00 to 8.50

Boston

Interest in Pig Iron Centers Largely in Inquiry for Moderate Tonnages

BOSTON, Sept. 9.—Interest in pig iron circles the past week focused on a Massachusetts textile machinery maker's inquiry for 500 to 1000 tons each of No. 2X and No. 1X, fourth quarter delivery, and an inquiry from a Clairmont, N. H., foundry for 300 tons, Oct. 1 to Nov. 1 delivery, divided as follows: 100 tons northern silicon 2.25 to 2.75, 100 tons low phosphorus silicon 1.75 to 2.25, and 100 tons Virginia or northern silicon 3.25 to 3.75. On the first inquiry, few eastern Pennsylvania and Buffalo furnaces cared to quote on No. 1X, and those who did were considerably out of line with foreign iron prices. Eastern Pennsylvania furnaces bid $24.65, $25.15 and $25.65 delivered on the No. 2X. One Buffalo furnace bid $24.91 delivered and another less than $24.40, just how much less cannot be ascertained. Indian No. 2X is available at a delivered price under either eastern Pennsylvania or Buffalo, but in limited quantities. If, therefore, the buyer takes 1000 tons of No. 2X, Indian furnaces may not want to accept the order. The Clairmont, N. H., inquiry is too fresh to secure details regarding prices bid. Actual sales since last reports were confined to a few hundred tons, mostly eastern Pennsylvania and Buffalo, more generally at the higher than the lower prices quoted below.

We quote delivered prices on the basis of the latest reported sales as follows, having added $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia and $9.60 from Alabama:

East. Penn., sil. 1.75 to 2.25	$24.15 to $25.15
East. Penn., sil. 2.25 to 2.75	24.65 to 25.15
Buffalo, sil. 1.75 to 2.25	23.91 to 24.41
Buffalo, sil. 2.25 to 2.75	24.41 to 24.91
Virginia, sil. 2.25 to 2.75	30.42 to 31.42
Alabama, sil. 1.75 to 2.25	27.60

Cast Iron Pipe.—Providence, R. I., has purchased 150 tons of 16-in. pipe and fittings from the Warren Foundry & Pipe Co., the largest pipe contract placed in this district in several weeks. No sizable open inquiries are in the market. Water companies and gas producers are feeling out the market for spring delivery, however, and indications are another month or so will witness a material improvement in going business. Prices remain unchanged as follows: F.o.b. Boston common rate points, 6-in. to 12-in pipe, inclusive, $62.10 a ton; 16-in. and larger, $60.10 to $61.10. The usual $5 differential for Class A and gas pipe is charged.

Coke.—The movement of by-product foundry coke from New England ovens to consuming points so far this month has been on about a par with August, which,

it will be recalled, showed a slight increase over July in shipments. Coke producers are operating practically full, but largely on domestic sizes. Both the New England Coal & Coke Co. and the Providence Gas Co. quote by-product foundry coke at $11.50 a ton delivered in New England. Foundries evince little interest in coke made outside New England.

Fabricated Steel.—Prospective builders are slow in covering on fabricated steel tonnages, and current inquiry continues for small amounts of stock. Local fabricators have figures out on a total of 4000 to 5000 tons, but in only one instance does an individual inquiry exceed 500 tons. The number of small prospective jobs is increasing, however, and a few call for deliveries next spring. In addition, fabricators are not so anxious to take certain jobs as heretofore except on higher shop cost figures. Although no higher, prices on shapes appear steadier.

Old Material.—The best local dealers will now pay for heavy melting steel for shipment to eastern Pennsylvania is $12.50 on cars. Car lots were bought the past week at $12.25 and $12. It appears, therefore, the market actually is off 50c. a ton from general quotations of a week ago. Sales of No. 1 wrought are reported at $13.50 and $13.75 and in one instance at least at $14, these prices also representing a setback of 50c. a ton. Mixed borings and turnings have been purchased at $8.10, still further proof that previously quoted prices are being shaded. Otherwise there is not enough current business to determine the actual status of prices, although it is apparent on the surface they are easier. Dealers generally are holding off for higher prices, but values unquestionally have slipped, conditions in markets outside New England notwithstanding.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$19.50 to $20.00
No. 2 machinery cast	16.50 to 17.00
Stove plates	15.00 to 15.50
Railroad malleable	17.00 to 17.50

The following prices are offered per gross ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$12.00 to $12.50
No. 1 railroad wrought	13.50 to 14.00
No. 1 yard wrought	12.50 to 13.00
Wrought pipe (1-in. in diam., over 2 ft. long)	11.50 to 12.00
Machine shop turnings	8.50 to 9.00
Cast iron borings, chemical	10.00 to 10.50
Cast iron borings, rolling mill	8.50 to 9.00
Blast furnace borings and turnings	8.00 to 8.25
Forged scrap and bundled skeleton	9.00 to 9.50
Shafting	18.00 to 19.00
Street car axles	18.00 to 19.00
Rails for rolling	13.50 to 14.00

Cincinnati

Pig Iron Prices Firmer, but Sales Confined to Small Tonnages

CINCINNATI, Sept. 9.—Total tonnage of pig iron booked in the Cincinnati market the past week measures up well with the previous week, but sales have been confined to small orders. Prices are displaying an upward movement. The price of $20, furnace, on southern Ohio iron is now well established. Sales of southern Ohio iron maintained a fair level and were scattered among a number of buyers, each of which bought only a small tonnage. Quotations of Southern iron are stronger than they were a year ago. While some sales have been made at $17.50, Birmingham, local dealers state that certain furnaces will not accept business at less than $18. A few small sales have been made at $18.50, indicating that prices are more firm. The largest sale reported was 700 tons of Lake Superior charcoal. Inquiries are fair and are mostly for carload lots. A Michigan melter is in the market for 500 tons of Southern iron and an Indianapolis melter for 300 tons.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton we quote f.o.b. Cincinnati:

Southern fdy., sil. 1.75 to 2.25 (base)	$21.55 to $22.05
Southern fdy., sil. 2.25 to 2.75	22.05 to 22.55
Southern Ohio silvery, 8 per cent	31.77
Southern Ohio fdy., sil. 1.75 to 2.25	22.27
Southern Ohio, basic	21.77
Southern Ohio malleable	22.27

Sheets.—Buyers are feeling their way cautiously and are purchasing conservatively at present. There is, however, a little more activity in the market and there is a better tone evident than last week. Orders are being placed only for immediate needs and are confined to small purchases. Prices are unchanged from last week with 2.70c. quoted for blue annealed, 3.50c. for black and 4.60c. for galvanized. Prices are firmer than they were last week at these prevailing quotations. There have been a few sales of automobile body sheets at 4.75c., but business has been slow.

Tin Plate.—Sales of tin plate showed a nice increase in August as compared with the previous month, and September business has started off favorably. Can makers are operating their plants at capacity and have been making a fair number of purchases of tin plate. The price of $5.50 per base box has not changed and the market is steady at this figure. Local firms expect that the demand for tin plate will be good during the next few weeks.

Reinforcing Bars.—There have been no awards of consequence in the past week. Conditions have been quiet, but some small orders have been placed. Building activities are slow at present locally and this fact has been felt in the sale of reinforcing bars. Rail steel bars are bringing 1.90c. to 2.10c., while billet steel is quoted at 2.10c. to 2.15c.

Warehouse Business.—Tonnage is in line with that during the early part of August. There have been no large orders placed, but a good volume of small bookings has been recorded. The market is steady and prices are the same as last week. Dealers expect September to keep pace with August, which was the best month since May in volume of business. Prospects point to increased sales the latter part of the month.

Cincinnati jobbers quote: Iron and steel bars, 3.30c.; reinforcing bars, 3.30c.; hoops, 4.35c.; bands, 3.95c.; shapes, 3.40c.; plates, 3.40c.; cold-rolled rounds, 4.05c.; cold-rolled flats, squares and hexagons, 4.55c.; open-hearth spring steel, 4.75c. to 5.75c.; No. 10 blue annealed sheets, 3.90c.; No. 28 black sheets, 4.60c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, 3.30c.; common wire nails, $3.30 per keg base; cement coated nails, $3 per keg.

Structural Steel.—The market for structural steel has been quiet during the past two weeks. No large awards have been made. Inquiries have been fair, but have been confined to small buildings requiring less than 100 tons.

Finished Materials.—There was only a fair amount of activity in the market the past week. This is partly attributed to the Labor Day holiday and the fact that many buyers are just getting back from their vacations. Orders were all for small amounts. Producers are inclined to pass up business rather than book it at a cut in the market quotations. This attitude is being felt here and consequently prices are firm, but have not changed since last week. Sales of plates, bars and shapes have been in small quantities. Bars are quoted generally at 2.15c., but it is admitted that a large tonnage could be bought for 2.10c. Plates are bringing 2c. on carload lots, while 2.05c. is the market price on shapes. In wire products low prices and quick delivery are being demanded by buyers, but the larger producers are holding out at the prevailing prices of $2.80 for wire nails and $2.55 for plain wire and are not displaying any tendency to grant price concessions. The volume of business on wire products in this market showed an improvement in August over July and a fair number of orders have been booked the past week. Business seems to be spotty, however, and the condition of the market in the immediate future is uncertain. Practically no business of consequence has developed in track accessories. There have been some good inquiries by railroads, but actual orders have not materialized.

Coke.—The coke market is quiet, with only small sales reported. Prices are showing more strength than a week ago. Inquiries do not point to any improvement in local market at present.

Connellsville furnace, $3; foundry, $4.50 to $5.50; New River foundry, $8.50 to $9.00; Wise County furnace, $3.75; foundry, $4.50 to $5.50; by-product foundry, $6.50, Connellsville basis.

Old Material.—The scrap market is featured by the deadlock between dealers and buyers. The latter are not interested in purchasing unless they can buy at price concessions. Dealers are bullish in their attitude and are refusing to cut prices. The result is that only several small sales have been made. Dealers report that railroad lists are exceptionally small. Prices are firm, with an upward tendency evident.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

Per Gross Ton

Heavy melting steel	$14.00 to $14.50
Scrap rails for melting	12.50 to 13.00
Short rails	17.00 to 17.50
Relaying rails	29.50 to 30.00
Rails for rolling	14.50 to 15.00
Old car wheels	13.00 to 13.50
No. 1 locomotive tires	14.00 to 14.50
Railroad malleable	15.50 to 16.00
Agricultural malleable	14.00 to 14.50
Loose sheet clippings	9.50 to 10.00
Champion bundled sheets	11.00 to 11.50

Per Net Ton

Cast iron borings	10.00 to 11.00
Machine shop turnings	9.00 to 9.50
No. 1 machinery cast	18.00 to 18.50
No. 1 railroad cast	15.50 to 16.00
Iron axles	21.50 to 22.00
No. 1 railroad wrought	11.00 to 11.50
Pipes and flues	8.00 to 8.50
No. 1 busheling	10.00 to 10.50
Mixed busheling	8.00 to 8.50
Burnt cast	10.50 to 11.00
Stove plate	10.50 to 11.00
Brake shoes	12.00 to 12.50

Cleveland

Pig Iron More Active—Some Improvement in Finished Lines

CLEVELAND, Sept. 9.—While conditions in the iron and steel industry did not change materially during the week, there was some improvement. Pig iron became more active and consumers are beginning to take an interest in first quarter contracts, evidently feeling that prices will not be lower and may go higher. One merchant blast furnace in this district blew in during the week and a steel works furnace will start up this month. In finished steel, buying showed a little gain. Consumers are placing orders somewhat more liberally for stock than a few weeks ago, although they are still buying cautiously, and business is well distributed among the various consuming industries. Good specifications for steel bars came from bolt and nut manufacturers. The improvement previously noted in the automotive industry is holding up. The railroads in this territory are as yet showing no interest in 1925 rail requirements. In the structural field a fair volume of new work is being quietly figured on and one fabricator reports new inquiries aggregating 14,000 tons. Competition is very keen and the market lacks firmness, although most mills are resisting the pressure of buyers for lower prices.

Pig Iron.—Inquiries for a round tonnage of foundry and malleable iron for the first quarter of next year came out during the week from automobile and other interests. One producer made a few small lot sales for that delivery at current prices, but others have not made quotations and in view of the present firmness of the market are not showing any eagerness to sell iron for next year at present prices. The market continues rather active, with the sales during the past week larger than in the preceding week. Two local interests sold about 18,000 tons. This includes one order for 7000 tons of foundry iron from the Pittsburgh district and two 3000-ton lots of foundry and malleable iron, all for the fourth quarter. One local interest has withdrawn from the market except for prompt shipment business. Prices are well established at $20 Lake and Valley furnace for foundry and malleable grades, although one Lake furnace is still going to $19.50 in some cases to meet competition where it has a disadvantage in freight rates. However, the bulk of the tonnage placed during the week went at $20 and one Lake furnace is now quoting $20.50 in some cases. For Cleveland delivery the price is unchanged at $20.50 at furnace. The melt is increasing and releases for September, particularly from the automobile industry, indicate considerable gain in the consumption this month over August. The 5000-ton lot of basic iron purchased by a Canton consumer went to a Lake furnace at $19. Pickands, Mather & Co. blew in their Perry furnace at Erie, Pa., Monday, and the United Alloy Steel Corporation, Canton, Ohio, will blow in its furnace this month. The Perry furnace was blown out for rebuilding last December.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and $6 rate from Birmingham:

Basic, Valley furnace	$19.00
N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.50 to 21.00
Southern fdy., sil. 1.75 to 2.25	23.50
Malleable	20.50
Ohio silvery, 8 per cent	33.52
Stand. low phos., Valley furnace	27.50 to 28.00

Iron Ore.—On Sept. 1 there was 6,454,724 gross tons of Lake Superior ore on hand at Lake Erie docks, as compared with 5,753,794 tons on Aug 1 and with 5,907,272 tons on Sept. 1 last year. Receipts at Lake Erie ports during August were 4,974,693 tons, as compared with 7,681,661 tons during August last year. Receipts at these ports for the season until Sept. 1 were 20,183,830 tons, as against 26,801,418 tons during the corresponding period last year. August shipments from Lake Erie ports were 3,080,829 tons, as against 5,213,782 tons during August, 1923. Total shipments from Lake Erie docks this season until Sept. 1 were 15,271,914 tons, as compared with 22,334,127 tons during the corresponding period a year ago. August receipts at other than Lake Erie ports were 1,517,496 tons, as compared with 2,584,216 tons during August last year.

Bolts, Nuts and Rivets.—Bolt and nut makers Sept. 5 advanced prices 10 per cent on machine and carriage bolts and 25c. on hot-pressed and cold-punched nuts. The new prices are for both current orders and fourth quarter contracts. Manufacturers have long complained that there has been no profit in recent prices. The new prices, if maintained, will prove of little benefit to manufacturers before October, as most buyers are under contract. A few fourth quarter contracts have been taken at the advance. The largest rivet inquiry that has appeared in a number of months has come from a Chicago car shop for 2000 tons of rivets for car repair work for delivery over a period of six months, but some manufacturers have declined to quote on this inquiry for delivery beyond the fourth quarter. Regular prices are being well maintained.

Steel Bars, Plates and Structural Material.—Steel bars are fairly active and the market is firm at 2.10c., Pittsburgh, although some concessions are being made by smaller mills that are giving the consumers the benefit of a portion of their freight advantage over Pittsburgh. In some cases quotations have appeared that figure back close to 2c., Pittsburgh. Some consumers have come into the market for fourth quarter contracts and these have been taken at 2.15c., with the understanding that the mill is to accept specifications at 2.10c. as long as that is its current market price. Plates have developed further weakness. While sales are still being made at 2c., 1.90c. has become the more common price and desirable lots are bringing out a 1.85c. quotation. Small lot plate sales have improved, but round lot demand is lacking. The Louisville & Nashville Railroad has an inquiry out for 400 tons of structural material. The price range is from 2c. to 2.10c.

Strip Steel.—Hot-rolled strip steel is weak and irregular and a quotation of 2.10c. has not been low enough to take some round lot business from a maker of cold-rolled strips. Sales of automobile rim bands have been made at 2.20c. to 2.25c. Narrow bands are holding firm at 2.40c. and hoops at 2.60c. Cold-rolled strip steel ranges from 4c. to 4.25c.

Sheets.—Most consumers are buying from hand to mouth and the demand is only moderate. The larger mills are holding to 3.50c. for black, 2.70c. for blue annealed, and 4.60c. for galvanized sheets, but buyers

are able to get concessions of $2 a ton on all grades from some sources. A good demand for automobile body seconds has resulted in a stiffening of prices on these to 3.45c. to 3.60c.

Semi-Finished Steel.—Some new inquiry for sheet bars is coming out and several fourth quarter contracts have been placed subject to trade paper quotations. The generally recognized price is $37.50, Youngstown. Billet prices are untested. While a small lot brought $37.50, Youngstown, a definite inquiry would doubtless bring out a $36, Pittsburgh, price.

Reinforcing Bars.—Inquiries have come out for 700 tons of reinforcing bars for a building for the Columbus Railway Power & Light Co., Columbus, and for 375 tons for the Commodore Perry Hotel, Toledo. Prices are unchanged at 1.90c. to 2c. for rail steel bars.

Warehouse Business.—Prices on steel bars from warehouses are somewhat irregular, with a concession of $2 a ton rather common. Sheets out of stock are firm. Warehouse orders for steel bars show a gain over last month.

Jobbers quote steel bars, 3.10c.; plates and structural shapes, 3.20c.; No. 28 black sheets, 4.35c.; No. 28 galvanized sheets, 5.45c.; No. 10 blue annealed sheets, 3.45c. to 3.60c.; cold-rolled rounds, 4c.; flats, squares and hexagons, 4.50c.; hoops and bands, 1 in. and wider and 20 gage or heavier, 3.85c.; narrower than 1 in. or lighter than No. 20 gage, 4.35c.; No. 9 annealed wire, $3.30 per 100 lb.; No. 9 galvanized wire, $3.75 per 100 lb.; common wire nails, $3.40 base per 100 lb.

Coke.—Some contracts are being placed for foundry coke. Prices are unchanged at $4 to $5.50 for standard Connellsville foundry grades.

Old Material.—There was some quiet buying of heavy melting steel and compressed sheet steel and turnings by consumers during the week and this has stimulated activity among dealers who are covering on sales and prices have further advanced 25c. to 50c. a ton on most grades. The amount of scrap that is being offered is not large, being confined to current production, as stocks generally are being held for higher prices which some predict. Scrap offered a few days ago by a leading Detroit automobile manufacturer covering September production went at good prices. It is reported that compressed sheet steel brought $13.50 and shoveling turnings $12 per ton. A Cleveland consumer during the week purchased several thousand tons of borings and turnings from a Detroit dealer at $14.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel	$15.75 to $16.25
Rails for rolling	16.00 to 16.50
Rails under 3 ft	16.75 to 17.00
Low phosphorus melting	18.00 to 18.50
Cast iron borings	14.25 to 14.75
Machine shop turnings	13.50 to 13.75
Mixed borings and short turnings	14.25 to 14.50
Compressed sheet steel	14.00 to 14.25
Railroad wrought	14.00 to 14.25
Railroad malleable	17.25 to 17.75
Light bundled sheet stampings	13.50 to 13.75
Steel axle turnings	14.50 to 14.75
No. 1 cast	18.75 to 19.25
No. 1 busheling	13.50 to 14.00
Drop forge flashings	13.25 to 13.50
Railroad grate bars	14.25 to 14.75
Stove plate	14.25 to 14.75
Pipes and flues	12.00 to 12.50

Philadelphia

No Improvement in Business Has Developed So Far This Month

PHILADELPHIA, Sept. 9.—Steel business, which showed promising indications in the latter half of August, has shown no appreciable gain in the seven business days of September. It is no better and no worse than it was one, two or three weeks ago. This is somewhat of a disappointment to the local steel trade, which had expected that the slight momentum gathered in late August would roll up into larger proportions in the early part of this month. The brightest sign on the horizon is the promise of increasing railroad buying. The placing of orders for 10,000 cars by the Pennsylvania Railroad has been widely heralded and has helped to create a spirit of optimism. Locomotive business also appears slightly more promising, the orders of the Missouri Pacific for 50 engines, placed with two eastern builders, having been the largest buying of its kind in some time. The Baltimore & Ohio and the Lehigh Valley are expected to buy motive power equipment shortly, and the local locomotive works is figuring on 25 engines for New South Wales. It has just received an order for six from India.

One side of the steel situation is not very encouraging from the mill viewpoint, and that is the matter of prices. Plates, in particular, have shown further marked weakness, sales having been made at as low as 1.60c., Pittsburgh. Billets are also weak and a 500-ton sale is reported at $34, Pittsburgh, a drop of $3 a ton from last reported transactions. Concrete reinforcing bars have been sold at 2.05c., Pittsburgh, and are none too strong, as will probably be in evidence on 2500 tons required for the new building of Montgomery Ward & Co., Baltimore, award of which will probably be made this week. Bands are available at 2.40c., Pittsburgh, particularly the wider sizes, although some mills continue to quote 2.50c. Structural shapes, which mills have been attempting to hold at 2c., Pittsburgh, although lower prices have been available on the larger tonnages, are now more freely quoted at concessions from that figure, and the market range today is 1.90c. to 2c., Pittsburgh.

Pig Iron.—Last week's pig iron business was on the moderate basis of preceding weeks. One of the more active sellers booked orders for 9000 tons, with no single order exceeding 1000 tons, but some of the other furnaces, less anxious for business, have not taken on much tonnage. One furnace company, which recently advanced its price to $21, base, has the equivalent of three months' output on its books and is not anxious for orders even at $21. Another furnace is well sold up for October and succeeding months, but needs orders for spot shipment. Thus, from the sellers' point of view the situation varies somewhat according to the status of the order book of each furnace. On the whole, the situation has improved, in that stocks are slightly lower than a month ago and less iron was made in August by the furnaces in the eastern Pennsylvania group. Until foundries increase their melt, however, no marked betterment in business can be expected. Some shipments are being held up, probably due to the fact that foundry orders have not increased up to this time as rapidly as some buyers had expected. Foundry iron is still to be had at $20.50, furnace, for No. 2 plain and at $21, furnace, for No. 2X. Other grades are unchanged. The Pennsylvania Railroad is inquiring for 5000 tons of foundry iron for fourth quarter, this being the only inquiry of importance in the market.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to $1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$21.26 to $22.13
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.63
East. Pa. No. 1X	22.26 to 23.13
Virginia No. 2 plain, 1.75 to 2.25 sil.	28.17 to 28.67
Virginia No. 2X, 2.25 to 2.75 sil.	28.67 to 29.17
Basic delivered eastern Pa.	20.00 to 21.00
Gray forge	21.00 to 22.00
Malleable	22.00 to 22.50
Standard low phos. (f.o.b. furnace)	24.00 to 25.00
Copper bearing low phos. (f.o.b. furnace)	24.00 to 25.00

Ferroalloys.—The leading domestic producer, which recently took orders for several thousand tons at $90, furnace, and then advanced its price to $95, is now quoting $100, but has made no sales either at $95 or $100. Agents of British producers continue to quote $95, seaboard, but are making few sales.

Billets.—Marked weakness has developed in billets, a sale of 500 tons having been made by a leading producer at $34, Pittsburgh. That this is not yet a going market price is indicated, however, by the fact that sales have been made by other mills at prices ranging from $36 to $38 for rerolling quality. The market has

been quoted recently at $37 for rerolling quality and $42 for forging quality, but some users of billets have been hesitant to pay these prices in view of the low prices at which their finished products have been selling.

Plates.—Eastern plate mills, which have led in the declining prices of plates, are now somewhat in despair over the extremes in prices to which keen competition has driven them. The current market level is said to be dollars a ton below the production costs of some, if not all, of the mills. One company has instructed its local office that it will not take further business at less than 1.70c., Pittsburgh, but this is not now the lowest point to which prices have gone, one leading producer having taken orders at 1.60c. A more common price on business of the past week was 1.65c. A railroad received bids from two or three mills on its line of 1.70c., f.o.b. cars, but did not place orders. Orders for plates have not come to the mills as freely this month as they did in the latter part of August, and one large independent company did not operate any of its mills last week. Eight of its open-hearth furnaces were operating, piling "cold steel."

Structural Material.—For some time Eastern fabricators have been getting prices as low as 1.90c., Pittsburgh, on structural shapes for the larger projects, but recently the Eastern mills have been attempting to hold the price at 2c. Keen competition, however, has brought further weakness and 1.90c., Pittsburgh, is now an "open" price in many instances. Small lots are sold at 2c. The demand for shapes has not increased in the past week, but shape mills are operating at a much better rate than other finishing departments. The practice of selling bar-size angles on the structural base, inaugurated a few weeks ago by a leading independent, is now more general, but usually applies to sizes above 1 in. On 1 in. or smaller the bar base applies. Construction work in this district is light in volume, but fabricating shops are well engaged on work taken in the past two or three months. Within a week or two the City of Philadelphia will ask for bids on the second section of the Broad Street subway, which will take 10,000 tons of steel, the same amount as was purchased for the first section.

Bars.—Although merchant steel bars are fairly firm at 2.10c., Pittsburgh, some weakness has developed in concrete reinforcing bars, which have been sold at 2.05c. The award of 2500 tons for the warehouse of Montgomery Ward & Co., Baltimore, will probably be made this week, and the trade is watching with interest the price developments in this letting. Bar iron is still being sold at 2c., Pittsburgh, by Eastern mills. Some sales of hot rolled bands have been made at 2.40c., Pittsburgh. The Pennsylvania Railroad is inquiring for 250 tons of spikes.

Sheets.—Less talk is heard of concessions in prices on sheets. Eastern mills are quoting 4.60c. on galvanized, 3.50c. on black and 2.70c. on blue annealed, Pittsburgh basis. Business has not improved materially since the first of the month.

Warehouse Business.—Sales of steel out of stock have shown a falling off as compared with a few weeks ago. Prices are unchanged, for local delivery being as follows:

Soft steel bars and small shapes, 3.22c.; iron bars (except bands), 3.22c.; round edge iron, 3.50c.; round edge steel, iron finished, 1½ x ½ in., 3.50c.; round edge steel planished, 4.30c.; tank steel plates, ¼ in. and heavier, 3.32c.; tank steel plates, ⅜ in., 3.47c.; blue annealed steel sheets, No. 10 gage, 3.75c.; black sheets, No. 28 gage, 4.75c.; galvanized sheets, No. 28 gage, 5.85c.; square twisted and deformed steel bars, 3.22c.; structural shapes, 3.32c.; diamond pattern plates, ¼-in., 5.30c.; ⅜-in., 5.50c.; spring steel, 5c.; round cold-rolled steel, 4.15c.; squares and hexagons, cold-rolled steel, 4.65c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.10c.; narrower than 1 in., all gages, 4.60c.; steel bands, No. 12 gage to ⅜ in., inclusive, 3.97c.; rails, 3.35c.; tool steel, 8.50c.; Norway iron, 7c.

Imports.—In the past week 11,950 tons of iron ore has come in at this port from French Africa, and 6611 tons from Spain. Cuba shipped 4133 tons of iron and steel scrap to this port.

Old Material.—Buying of scrap has been limited in volume in the past week, and there has been little to support the market except the continued optimism of the scrap trade that steel business will soon improve sufficiently to bring about a larger demand for scrap. Of no little effect upon the attitude of brokers and dealers was the sale of the Pennsylvania list for this month at very high prices. Some of the prices paid by consumers were so much higher than dealers bid for the same material that the dealers got comparatively little. Small sales of heavy melting steel have been made at $17.50, delivered, but on a larger tonnage it would undoubtedly be necessary for a mill to pay $18, and in fact this is said to have been paid in at least one instance. A local buyer of bundled sheets and turnings for steel works use has reduced its price to $13.50, but up to today had made no purchases at that figure. Another buyer of the same grades has paid upward of $14, so the market remains virtually as it was a week ago. Rolled steel wheels and couplers and knuckles are firmer, and are now quoted at $20 to $21, delivered.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$17.00 to $18.00
Scrap rails	17.00 to 18.00
Steel rails for rolling	19.00 to 19.50
No. 1 low phos., heavy 0.04 and under	21.00 to 21.50
Couplers and knuckles	20.00 to 21.00
Rolled steel wheels	20.00 to 21.00
Cast-iron car wheels	18.00 to 18.50
No. 1 railroad wrought	19.00 to 20.00
No. 1 yard wrought	17.00 to 17.50
No. 1 forge fire	14.50 to 15.00
Bundled sheets (for steel works)	14.00 to 14.50
Mixed borings and turnings (for blast furnace use)	12.50 to 13.00
Machine shop turnings (for steel works use)	14.00 to 14.50
Machine shop turnings (for rolling mill use)	14.00 to 14.50
Heavy axle turnings (or equivalent)	16.50 to 17.00
Cast borings (for steel works and rolling mills)	14.00 to 14.50
Cast borings (for chemical plants)	15.50 to 16.00
No. 1 cast	18.00 to 18.50
Heavy breakable cast (for steel plants)	17.00 to 17.50
Railroad grate bars	15.50 to 16.00
Stove plate (for steel plant use)	15.50 to 16.00
Wrought iron and soft steel pipes and tubes (new specifications)	16.50 to 17.00
Shafting	25.00 to 26.00
Steel axles	24.00 to 25.00

Penn Seaboard to Add Finishing Mills

The Penn Seaboard Steel Corporation, Philadelphia, will soon install finishing mills at its plant at New Castle, Del. An investment of about $1,000,000 is contemplated. A new 50-ton open-hearth furnace at this plant was recently completed and two more of the same capacity will be built.

Wanted: $50,000 for Bearing-Metals Research

Some months ago the work of the A. S. M. E. special research committee on bearing metals had reached the point where it became necessary to supplement the work of the members of the committee by efforts on a much larger scale. Accordingly it was proposed to raise a fund of $50,000 for the purpose of prosecuting research in this field by the employment of a specialist for a period of probably five years, whose work might be done at the Bureau of Standards in Washington or another laboratory under the most favorable conditions.

This committee, C. H. Bierbaum, Buffalo, N. Y., chairman, John A. Capp and Prof. H. Diederichs, has not only secured subscriptions amounting to $13,000 but it has received assurance from industries that they are in hearty sympathy with the project. The interest of the Engineering Foundation, which is acting as trustee for the fund, is evidenced by a subscription for $5,000.

The National Association of Brass Manufacturers will hold its general fall meeting Thursday, Sept. 18, at the Old Colony Club, Hotel Cleveland, Cleveland. William M. Webster, City Hall Square Building, Chicago, is commissioner.

FABRICATED STEEL BUSINESS

Light Tonnage in Both Awards and Inquiries During the Past Week

Awards of structural steel for the past week, as reported to THE IRON AGE, were slightly under 11,000 tons, one of the lowest records for the year. Fresh pending work totals only 10,220 tons, also a small amount as compared with the totals reported each week during the year. Oil tanks accounted for 3000 tons of the 10,972 tons awarded.

Church, Hartford, Conn., 200 tons, to American Bridge Co.

American Smelting & Refining Co., rod mill, 800 tons, to McClintic-Marshall Co.

New Orleans Public Service Co., boiler house, 900 tons, to Virginia Bridge & Iron Co.

Standard Oil Co. of New Jersey, boiler house at Jersey City, 900 tons, to McClintic-Marshall Co.

Apartment building, New York, 500 tons, to George A. Just Co.

Fraternal Order of Eagles, Buffalo, clubhouse, 300 tons, to Kellogg Structural Steel Co.

School, No. 71, Buffalo, 150 tons, to Bancroft-Jones Steel Corporation, and not as reported last week.

Struthers-Wells Co., Warren, Pa., boiler shop extension, 300 tons to McClintic-Marshall Co.

Shenandoah Hotel, Martinsburg, W. Va., 200 tons, to Jones & Laughlin Steel Corporation.

New York Central Railroad, bridge over Center Street, Ashtabula, Ohio, 150 tons, to Milwaukee Bridge Co.

Maryland Refining Co., 10 oil storage tanks, Ponca City, Okla., 3000 tons, to Chicago Bridge & Iron Works.

University of Chicago, laboratory building, 510 tons, to American Bridge Co.

Selig Building, Indianapolis, 400 tons, to Insley Mfg. Co.

World-Herald building, Omaha, Neb., 350 tons, to Omaha Steel Works.

Northern Pacific Railway, bridge over Powder River, Mont., 162 tons, to American Bridge Co.

Lumberman's Exchange Building, Chicago, location changed and tonnage increased from 2000 to 3500, fabrication by Morava Construction Co.

F. W. Woolworth Building, Cleveland, 700 tons, to American Bridge Co.

Spencer Hospital and telephone exchange building, Meadville, Pa., 100 tons, to Rogers Iron Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Loft building, 18 East Fifty-third Street, New York, 500 tons.

Loft building, 243 West Thirtieth Street, New York, 1000 tons.

Loft building, 13 West Thirty-sixth Street, 500 tons.

Bible House, Fifty-fifth Street, New York, 900 tons.

Apartment building, 316 West Seventy-second Street, New York, 800 tons.

State of Maryland, highway bridge at Oakland, 300 tons.

State of Vermont, highway bridge, 200 tons.

Hotel, Glens Falls, N. Y., 400 tons.

Conley Foil Co., plant addition at Glendale, Long Island, 1500 tons.

United States Government, veterans' hospital at Castle Point, N. J., 400 tons.

Bancroft Hotel, Worcester, Mass., addition, 400 tons.

Williston, Vt., bridge, 200 tons.

New York, New Haven & Hartford Railroad, bridge at East River, Conn., 145 tons.

Sheffield, Mass., State highway bridge, 100 tons.

Apartment house, Boston, 400 tons.

Marquette University high school, Milwaukee, 100 tons, bids being taken.

Biltmore-Grande apartment, Milwaukee, 175 tons, bids being taken.

Apartment building, Nineteenth Street and Rittenhouse Square, Philadelphia, 800 tons; general contract awarded.

Central Medical Building, Eighteenth and Chestnut Streets, Philadelphia, 600 tons; general contract awarded.

Medical Arts Building, Sixteenth and Walnut Streets, Philadelphia, addition, 800 tons.

RAILROAD EQUIPMENT BUYING

Pennsylvania Orders 10,000 Cars and Texas & Pacific 2000—Inquiries for 8000

The Pennsylvania Railroad announces the placing of orders for 10,000 all-steel box cars, divided equally among four car companies. The Texas & Pacific bought 2000. The St. Louis-San Francisco is inquiring for 5000 and the Reading for 3000. Several other roads are expected to enter the market for equipment shortly.

Reports filed with the car service division of the American Railway Association, Washington, show that on Aug. 15 Class I railroads had 203,941 freight cars and 11,623 locomotives in need of repair. The cars needing repairs totaled 8.9 per cent of the number on line, while the locomotives were 18 per cent of the number on line. This was an increase in the number of both cars and locomotives needing repairs.

The Department of Commerce reports that shipments of locomotives from American shops in August numbered 139, of which 121 were domestic and 18 foreign. Unfilled orders at the end of August totaled 361 engines, of which 306 are for domestic shipment and 55 for foreign shipment. The highest record of unfilled orders in the past two years was in February, 1923, when the total was 2220.

The car order for the National Railways of Mexico, recently obtained by S. M. Vauclain, president Baldwin Locomotive Works, and distributed to the Standard Steel Car Co. and the General American Tank Car Co., included the following: 300 box cars, 200 stock cars, 200 tank cars and 50 gondolas, all standard gage; 800 box cars, 140 stock cars and 50 tank cars, all narrow gage.

The Texas & Pacific Railroad has ordered 1000 automobile box cars from the American Car & Foundry Co. and 1000 of the same type from the Pullman Co.

The Reading Co. has issued an inquiry for 3000 freight cars, of which 1000 are to be 70-ton all-steel gondolas, 1000 50-ton box cars and 1000 55-ton hopper cars.

The Interborough Rapid Transit Co., New York, will inquire soon for 150 steel subway cars.

The Pennsylvania Railroad has divided an order for 10,000 all-steel box cars equally among the American Car & Foundry Co., Standard Steel Car Co., Pressed Steel Car Co. and Bethlehem Steel Co.

The Missouri Pacific Railroad, which recently inquired for 25 Mikado type, 10 Pacific type and 15 switching locomotives, has ordered 35 of these engines from the American Locomotive Co. and 15 from the Baldwin Locomotive Works.

The Chesapeake & Ohio Railroad has asked for bids on the repair of 25 Mallet type locomotives.

American locomotive builders are bidding on 25 locomotives for New South Wales.

The Baldwin Locomotive Works has received an order for 6 locomotives from India.

The Lehigh Valley is inquiring for locomotive equipment and the inquiry of the Baltimore & Ohio, figured on some time ago, has been revived.

The Missouri Pacific has entered the market for 2 parlor cars and 50 caboose cars in addition to the 2 dining cars for which it sent out an inquiry two weeks ago.

The Illinois Central is inquiring for 30 passenger coaches, 8 compartment coaches, 6 chair cars, 9 baggage cars, 10 baggage and mail cars, and 215 suburban cars, comprising 85 trailers and 130 motor cars.

The St. Louis-San Francisco has entered the market for 5000 freight cars.

The American Refrigerator Transit Co. has placed 50 express refrigerator cars with the General American Car Co.

Machine Tool Exhibition

About 120 exhibitors will demonstrate machinery and equipment at the New Haven machine tool meeting and exhibition, Sept. 15 to 18, at the Mason Laboratory, Yale University, and according to the *A. S. M. E. News* it will be "the greatest exhibit of machine tools and production equipment which has ever been brought together." In addition to several technical sessions, a meeting of the National Screw Thread Commission is scheduled and several standardization committees covering machine shop practice will hold sessions.

Prices Finished Iron and Steel f.o.b. Pittsburgh

Carload Lots

Plates

Sheared, tank quality, base, per lb.....1.80c. to 2c.

Structural Materials

Beams, channels, etc., base, per lb.....2c. to 2.10c.
Sheet piling .....2.10c. to 2.25c.

Iron and Steel Bars

Soft steel bars, base, per lb.....2.10c. to 2.15c.
Soft steel bars for cold finishing.....$3 per ton over base
Reinforcing steel bars, base.....2.10c. to 2.15c.
Refined iron bars, base, per lb.....2.90c. to 3c.
Double refined iron bars, base, per lb.....4.50c.
Stay bolt iron bars, base, per lb.....6.50c. to 7.00c.

Hot-Rolled Flats

Hoops, base, per lb.....2.60c. to 2.75c.
Bands, base, per lb.....2.50c. to 2.60c.
Strips, base, per lb.....2.25c. to 2.50c.

Cold-Finished Steel

Bars and shafting, drawn or rolled, base, per lb.....2.80c.
Bars and shafting, drawn or rolled, l.c.l., per lb.....3.05c.
Shafting, turned and polished, base, per lb.....2.80c.
Bars, S. A. E. Series, No. 2100.....4.25c. to 4.50c.
Bars, S. A. E. Series, No. 2300.....6.00c.
Bars, S. A. E. Series, No. 3100.....4.90c. to 5.00c.
Strips, base, per lb.....4.00c. to 4.25c.

Wire Products

(To jobbers in car lots)

Nails, base, per keg.....$2.80
Galvanized nails, 1 in. and over.....$2.25 over base
Galvanized nails, less than 1 in..... 2.50 over base
Bright plain wire, base, No. 9 gage, per 100 lb.....$2.55
Annealed fence wire, base, per 100 lb..... 2.70
Spring wire, base, per 100 lb..... 3.50
Galvanized wire No. 9, base, per 100 lb..... 3.15
Galvanized barbed, base, per 100 lb..... 3.50
Galvanized staples, base, per keg..... 3.50
Painted barbed wire, base, per 100 lb..... 3.25
Polished staples, base, per keg..... 3.25
Cement coated nails, base, per count keg..... 2.20
Woven fence (to jobbers) 726-12½-12, per 100 rods....18.70
Woven fence (to retailers) 726-12½-12, per 100 rods....20.03
Bale ties, carloads to jobbers..75, 5, 5 and 2½ per cent off list

Bolts and Nuts

Machine bolts, small rolled threads,
60 and 20 per cent off list
Machine bolts, all sizes, cut threads..60 and 10 per cent off list
Carriage bolts, smaller and shorter, rolled threads
60 and 10 per cent off list
Carriage bolts, cut threads, all sizes.....60 per cent off list
Hot-pressed nuts, blank or tapped, square.....4.50c. off list
Hot-pressed nuts, blank or tapped, hexagons.....5c. off list
C.p.c. and t. square or hex. nuts, blank or tapped..4.50c. off list
Eagle carriage bolts.....65, 10 and 10 per cent off list
Plow bolts .....50, 10 and 5 per cent off list

Semi-finished hex nuts:
⅞ in. and smaller, U. S. S....80, 10, 10 and 5 per cent off list
⅞ in. and larger, U. S. S....75, 10, 10 and 5 per cent off list
Small sizes, S. A. E.....80, 10, 10 and 5 per cent off list
S. A. E., ⅝ in. and larger.....75, 10 and 5 per cent off list
Stove bolts in packages.....80, 10 and 5 per cent off list
Stove bolts in bulk.....80, 10, 5 and 2½ per cent off list
Tire bolts .....60 and 10 per cent off list
Bolt ends with hot pressed nuts.....60 and 10 per cent off list
Bolt ends with cold pressed nuts....50 and 10 per cent off list
Turnbuckles, with ends, ½ in. and smaller,
55 and 5 per cent off list
Turnbuckles, without ends, ½ in. and smaller,
70 and 10 per cent off list
Washers .....5.75c. to 6.00c.
Lock washers .....80 per cent off list

Semi-Finished Castellated and Slotted Nuts

(To jobbers and consumers in large quantities f.o.b. Pittsburgh.)

	Per 1000 S. A. E.	Per 1000 U. S. S.		Per 1000 S. A. E.	Per 1000 U. S. S.
¼-in.	$4.25	$4.25	⅞-in.	$13.25	$13.50
⅜-in.	4.90	4.90	1-in.	16.25	16.50
⅜-in.	5.90	6.25	1⅛-in.	22.50	23.00
7/16-in.	7.50	8.50	1¼-in.	34.00	34.00
½-in.	9.75	10.00	1-in.	53.00	55.00

Larger sizes—Prices on application.

Cap and Set Screws

Milled hex. head cap screws.....85 per cent off list
Milled standard set screws, case hardened..85 per cent off list
Milled headless set screws, cut thread....85 per cent off list
Upset hex. head cap screws, U. S. S. thread.
85 and 10 per cent off list
Upset hex. head cap screws, S. A. E. thread,
85 and 10 per cent off list
Milled studs .....80 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb.....$2.60
Small rivets.....70, 10 and 5 per cent off list

Track Equipment

Spikes, ⅝ in. and larger, base, per 100 lb.....	$2.80
Spikes, ½ in. and smaller, base, per 100 lb.....	3.25
Spikes, boat and barge, base, per 100 lb.....	3.25
Track bolts, all sizes, base, per 100 lb.....	3.75
Track bolts, heat-treated, base, per 100 lb.....	4.25
Tie plates, per 100 lb.....	2.50
Angle bars, base, per 100 lb.....	2.75

Welded Pipe

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅜	+11	+29
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	2 to 3	61	50½
¼ to ⅜	47	30½	¼ to ⅜	+2	+54
½	53	42½	½	21	7
¾	58	47½	¾	28	12
1 to 1½	60	49½	1 to 1½	30	14

Lap Weld, extra strong, plain ends

2	53	42	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts are increased (on black) by one point, with supplementary discount of 5 per cent and (on galvanized) by 1½ points, with supplementary discount of 5 per cent.

Boiler Tubes

Lap Welded Steel		Charcoal Iron	
2 to 2¼ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1⅝ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3¾ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Standard Commercial Seamless Boiler Tubes
Cold Drawn

1 in.	55	3 and 3¼ in.	36
1¼ and 1½ in.	47	3½ and 3¾ in.	37
1¾ in.	31	4 in.	41
2 and 2¼ in.	22	4½ in. and 5 in.	33
2½ and 2¾ in.	32		

Hot Rolled

3 and 3¼ in.	38	4 in.	43
3½ in. and 3¾ in.	39		

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30 base.....87 per cent off list
Carbon 0.30 to 0.40, base.....85 per cent off list
Plus usual differentials and extras for cutting. Warehouse discounts range higher.

Seamless Locomotive and Superheater Tubes

	Cents per Ft.		Cents per Ft.
2-in. O.D. 12 gage	15	2¼-in. O.D. 10 gage	20
2-in. O.D. 11 gage	16	3-in. O.D. 7 gage	35
2-in. O.D. 10 gage	17	1¼-in. O.D. 9 gage	15
2¼-in. O.D. 12 gage	17	5⅜-in. O.D. 9 gage	55
2¼-in. O.D. 11 gage	18	5½-in. O.D. 9 gage	57

Tin Plate

Standard cokes, per base box.....$5.50

Terne Plate

(Per Package, 20 x 28 in.)

8-lb coating, 100 lb. base	$11.00	20-lb. coating I. C.	$14.90
8-lb. coating I. C.	11.30	25-lb. coating I. C.	16.20
12-lb. coating I. C.	12.70	30-lb coating I. C.	17.35
15-lb. coating I. C.	13.95	35-lb. coating I. C.	18.35
		40-lb. coating I. C.	19.35

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.65c. to 2.70c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.40c. to 3.50c.

Automobile Sheets

Regular auto body sheets, base (22 gage), per lb.....4.75c.

Galvanized

No. 28 (base), per lb.....4.55c. to 4.60c.

Long Ternes

No. 28 gage (base), 8-lb. coating, per lb.....4.95c. to 5c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.40c. to 3.50c.

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron	$5.65
Old range non-Bessemer, 51½ per cent iron	4.90
Mesabi Bessemer, 55 per cent iron	5.40
Mesabi non-Bessemer, 51½ per cent iron	4.75

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian	9.00c. to 9.50c.
Iron ore, Swedish, average 66 per cent iron	9.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus, nominal	45c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus	42c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, high grade, per unit, in 60 per cent concentrates	$8.00 to $8.50
Chrome ore, basic, 48 per cent Cr_2O_3, crude, per ton, c.i.f. Atlantic seaboard	18.50 to 24.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	80c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton	$90.00 to $95.00
Ferromanganese, foreign, 80 per cent, f.o.b. Atlantic port, duty paid	92.50 to 95.00
Ferrosilicon, 50 per cent, delivered	72.00 to 75.00
Ferrosilicon, 75 per cent	140.00
Ferrotungsten, per lb. contained metal	87c. to 90c.
Ferrochromium, 4 to 6 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered	10.75c.
Ferrochromium, 6 to 7 per cent carbon, 60 to 70 per cent Cr., per lb.	10.50c.
Ferrovanadium, per lb. contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, per net ton	200.00

Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated)

Spiegeleisen, domestic, 19 to 21 per cent, $32.00 to $33.00
Spiegeleisen, domestic, 16 to 19 per cent, 31.00 to 32.00
Ferrosilicon, Bessemer, 10 per cent, $39.50; 11 per cent, $42; 12 per cent, $44.50; 14 to 16 per cent (electric furnace), $36.00.
Silvery iron, 5 per cent, $27.00; 6 per cent, $28.00; 7 per cent, $29.00; 8 per cent, $30.50; 9 per cent, $32.50; 10 per cent, $34.50; 11 per cent, $37.00; 12 per cent, $39.50.

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	$18.00 to $19.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	19.00 to 20.00

Per 1000 f.o.b. works:

	High Duty	Moderate Duty
Fire Clay:		
Pennsylvania	$40.00 to $43.00	$36.00 to $40.00
Maryland	45.00 to 47.00	40.00 to 42.00
Ohio	40.00 to 43.00	37.00 to 39.00
Kentucky	42.00 to 43.00	37.00 to 39.00
Illinois	——	37.00 to 42.00
Missouri	42.00 to 45.00	35.00 to 40.00
Ground fire clay, per net ton		6.00 to 7.00
Silica Brick:		
Pennsylvania		35.00
Chicago		44.00 to 45.00
Birmingham		50.00
Ground silica clay, per net ton		7.50 to 8.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)		65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)		40.00
Chrome Brick:		
Standard size, per net ton		45.00

Semi-Finished Steel, F.O.B. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over	$37.00 to $38.00
Rolling billets, 2-in. and under	37.00 to 38.00
Forging billets, ordinary carbons	42.00 to 43.00
Sheet bars, Bessemer	$37.50 to 38.00
Sheet bars, open-hearth	37.50 to 38.00
Slabs	37.00 to 38.00
Wire rods, common soft, base, No. 5 to ⅜-in.	46.00
Wire rods, common soft, coarser than ⅜-in.	$2.50 over base
Wire rods, screw stock	$5.00 per ton over base
Wire rods, carbon, 0.20 to 0.40	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75	7.50 per ton over base
Wire rods, carbon over 0.75	10.00 per ton over base
Wire rods, acid	15.00 per ton over base
Skelp, grooved, per lb.	2c.
Skelp, sheared, per lb.	2c.
Skelp, universal, per lb.	2c.

Finished Iron and Steel, F.O.B. Mill

Rails, heavy, per gross ton	$43.00
Rails, light, new steel, base, lb.	1.85c. to 1.90c.
Rails, light, rail steel, base, per lb.	1.65c. to 1.75c.
Bars, common iron, base, per lb., Chicago mill	2.15c.
Bars, common iron, Pittsburgh mill	2.40c.
Bars, rail steel reinforcing, base, per lb.	2.10c. to 2.15c.
Rail steel bars, base, per lb., Chicago mill	2c.
Cold-finished steel bars, base, Chicago, per lb.	2.75c.
Ground shafting, base, per lb.	3.20c.
Cut nails, base, per keg	$2.90

Alloy Steel

S. A. E. Series Numbers	Bars 100 lb
2100* (1½% Nickel, 10 to 20 per cent Carbon)	$3.00 to $3.25
2300 (3½% Nickel)	4.75
2500 (5% Nickel)	6.00 to 6.50
3100 (Nickel Chromium)	3.65 to 3.75
3200 (Nickel Chromium)	5.50 to 5.75
3300 (Nickel Chromium)	7.25 to 8.00
3400 (Nickel Chromium)	6.50 to 7.00
5100 (Chromium Steel)	3.50 to 3.75
5200* (Chromium Steel)	7.50 to 8.00
6100 (Chromium Vanadium bars)	4.50
6100 (Chromium Vanadium spring steel)	4.25 to 4.50
9250 (Silicon Manganese spring steel)	3.50 to 3.75
Carbon Vanadium (0.45 to 0.55 Carbon, 0.15 Vanadium)	4c.
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium)	4.25 to 4.50
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum)	4.25 to 4.50
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	3.75 to 4.25
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum)	4.75 to 5.00

Above prices are for hot-rolled steel bars, forging quality, per 100-lb., f.o.b. Pittsburgh. For billets 4 x 4 to 10 x 10-in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4-in. down to and including 2½-in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, carload lots, 36,000 lb. minimum carload, per 100 lb:

Philadelphia, domestic	$0.32	Buffalo	$0.265	Kansas City	$0.735	*Pac. Coast, ship plates	$1.20
Philadelphia, export	0.235	Cleveland	0.19	Kansas City (pipe)	0.705	Birmingham	0.58
Baltimore, domestic	0.31	Youngstown	0.095	St. Paul	0.60	Memphis	0.56
Baltimore, export	0.225	Detroit	0.29	Omaha	0.735	Jacksonville, all rail	0.70
New York, domestic	0.34	Cincinnati	0.29	Omaha	0.705	Jacksonville, rail and water	0.415
New York, export	0.255	Indianapolis	0.31	*Denver	1.15	New Orleans	0.67
Boston, domestic	0.365	Chicago	0.34	†Denver (pipe)	1.17		
Boston, export	0.255	St. Louis	0.43	*Pacific Coast	1.15		

*Applied minimum carload 30,000 lb. †Minimum loading 46,000 lb.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 35c.; ship plates, 40c.; ingots and muck bars, structural steel, common wire products, including cut or wire nails, spikes, and wire hoops, 40c.; sheets and tin plates, 40c.; sheets, No. 12 gage and lighter, 50c.; rods, 40c.; wire rope cables and strands, 45c.; wire fencing, netting and stretcher, 40c.; pipes not over 12 in. in diameter, 55c.; over 12 in. in diameter, 2½c. per in. or fraction thereof additional. All rates per 100 lb. in carload lots, minimum 36,000 lb.

NON-FERROUS METALS

The Week's Prices

Cents per Pound for Early Delivery

	Copper, New York		Straits Tin (Spot)	Lead		Zinc	
Sept.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
3.....	13.75	13.37½	52.37½	8.20	8.00	6.62½	6.27½
4.....	13.62½	13.25	52.12½	8.15	7.95	6.60	6.25
5.....	13.62½	13.25	52.12½	8.10	7.95	6.57½	6.22½
6.....	13.62½	13.25	51.50	8.10	7.95	6.55	6.20
8.....	13.50	13.12½	50.87½	8.10	7.95	6.52½	6.17½
9.....	13.50	13.12½	51.12½	8.10	7.95	6.50	6.15

*Refinery quotation; delivered price ¼c. higher.

New York

NEW YORK, Sept. 9.

Pronounced dullness pervades all the markets and the situation is disappointing. It is difficult to sell copper and prices are lower. Buying of tin has been moderate in a declining market. The lead market is firm but inactive. Zinc has declined quite sharply, the buying being of fair proportions.

Copper.—Two important factors have had a marked influence on the copper market in the last week. The activity which was expected to follow the Labor Day holidays did not materialize and there is still a certain amount of so-called speculative metal to be disposed of. While most large producers adhere to the quotation which was the minimum a week ago, or 13.50c., delivered, some dealers and smaller producers are on a basis of 13.37½c., delivered. There is some metal from second hands and from speculative sources which is being offered as low as 13.25c., delivered, but it is stated that there are no takers at this price. Buying of the metal has been heavy in the last month and immediate demands are pretty well covered. Therefore, until the market shows a decided trend upward, buyers are remaining aloof and the market is exceedingly dull and lifeless. Lake copper is quoted at 13.50c. to 13.62½c., delivered. Absence of any news at all now concerning statistics of the industry is missed by all concerned.

Tin.—Demand for tin has been light compared with normal activity and during most of the past week very little interest has been shown by dealers and consumers. Total business for the week covered by this report has not been much over 700 tons. On Friday, Sept. 5, on the New York Metal Exchange, metal for Aug.-Sept. shipment from the East sold at 52c., and so did metal on steamers afloat. Yesterday the market was weak, due to a sharp decline in London and lower values for the pound sterling. Transactions, which totaled about 200 tons, were done down to 50.75c. for spot and 50.25c. for futures. Today there has been a better tone, due partly to a higher stock market, which in turn was evidently influenced by the Maine election. Sellers are therefore not making concessions and are not quoting. Business today, which totaled 150 to 200 tons, was done at a range of 51c. to 51.12½c. for spot and 50.62½c. to 50.75c. for futures. Spot Straits tin today was quoted at 51.12½c. The London quotations today, which were about £8 per ton less than a week ago, were £252 10s. for spot standard, £253 10s. for future standard and £253 15s. for spot Straits, with the Singapore quotation yesterday at £256. The statistics for August, which showed deliveries into consumption of 4805 tons, with 3454 tons in stock and landing on Aug. 31, are not considered favorable in the trade. Imports in August were 3200 tons, or 45,977 tons for the eight months. Arrivals thus far this month have been 1405 tons, with 5250 tons reported afloat.

Lead.—With sellers well sold and buyers well bought, the market is exceedingly quiet. One local refiner in the outside market is offering lead at 8.10c., New York, which is lower than a week ago. The St. Louis market has not weakened appreciably and stands at 7.95c. The leading interest still maintains its contract price at 8c., New York, with the outside market at 8.10c., the latter being largely a local quotation.

Zinc.—A sharp reaction has occurred in the slab zinc market, the quotation today being 6.15c., St. Louis, or 6.50c., New York, compared with 6.30c., St. Louis, or 6.65c., New York, a week ago, with some sales higher than this at that time. On the declining market a fair amount of business has been done, but here, too, the well-bought situation of buyers and the non-advent of more buying after the recent holidays have made for a weaker situation.

Nickel.—Shot and ingot nickel in wholesale lots are quoted at 27c. to 32c. per lb., with electrolytic nickel held at 32c. by the leading producers.

Antimony.—The war in China is evidently affecting the antimony market, as wholesale lots are quoted higher at 11c., New York, duty paid. Demand is almost nil.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted by importers at 27c. to 28c. per lb., duty paid, delivered.

Old Metals.—Business is fairly active and values are practically unchanged. Dealers' selling prices are as follows:

Copper, heavy and crucible	13.00
Copper, heavy and wire	12.00
Copper, light and bottoms	11.25
Heavy machine composition	10.50
Brass, heavy	8.50
Brass, light	7.00
No. 1 red brass or composition turnings	9.25
No. 1 yellow rod brass turnings	8.00
Lead, heavy	7.37
Lead, tea	6.25
Zinc	4.25
Cast aluminum	17.00
Sheet aluminum	17.00

Chicago

SEPT. 9.—Tin and lead have declined, while antimony has advanced. After wide fluctuations during the week, tin remains unsteady. Copper is softer, as evidenced by the fact that futures may now be bought on practically the same basis as spot metals. Lead is quiet with offerings freer than for some time. Zinc is also dull. Antimony has advanced as a result of uncertain deliveries from war-ridden China. Among the old metals copper and brass grades have declined while block tin has advanced. We quote in carload lots: Lake copper, 13.75c.; tin, 52c.; lead, 7.95c.; spelter, 6.25c.; antimony, 12.50c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 10.50c.; copper bottoms, 9c.; red brass, 8.25c.; yellow brass, 7c.; lead pipe, 7c.; zinc, 4c.; pewter, No. 1, 25c.; tin foil, 32c.; block tin, 40c., all buying prices for less than carload lots.

The Lake Superior Iron Ore Market

The Lake Superior iron ore market, which has been very unsatisfactory to the ore companies this year on account of the low prices made at the beginning of the season, the limited demand and the irregularity in prices later in the season, is closing with a sort of mopping up process in which some additional sales are being made at lower prices than the regular schedule which has prevailed on a very large percentage of the sales made during the season. A sale of 20,000 tons was made by one of the smaller ore companies Tuesday, but the seller stated that the 60c. reduction reported in some quarters last week is not being made.

Nine of the 27 sheet and tin plate plants of the American Sheet & Tin Plate Co. operated in July without a single lost time accident. This compares with six plants making such a record in the previous month. The plants which escaped lost time accidents in July were those at Bridgeport, Ohio; both the tin mill and sheet mill plants at Cambridge, Ohio; Wellsville, Ohio; New Castle, New Kensington, Scottdale and McKeesport, Pa., and the sheet mill at Gary, Ind.

PERSONAL

James H. Gray, for many years a member of the technical staff of the United States Steel Corporation and latterly chairman of the corporation's open-hearth steel committee, has resigned his position and sails this week for France to take up his permanent residence in Nice. Mr. Gray has done important work in the development of the electric furnace in the United States, particularly in increasing the size of the unit, and had charge for several years of the installation of Heroult electric furnaces under Steel Corporation auspices. Mr. Gray's first work in steel metallurgy was with the Illinois Steel Co. as an assistant to the late W. R. Walker and he came to New York with Mr. Walker when the Steel Corporation was formed.

W. J. Filbert, comptroller of the United States Steel Corporation, returns to New York this week after ten weeks in Europe, spent chiefly in France.

P. R. Owens, who has been assistant auditor of the Gulf States Steel Co., Birmingham, Ala., for several years, has been elected secretary and auditor of the company to succeed the late Hubert Moore.

C. W. Titgemeyer on Oct. 1 will succeed H. W. Steinkraus as brush division sales manager of the Osborn Mfg. Co., Cleveland.

Charles P. Perin of the consulting engineering firm of Perin & Marshall, New York, sailed on the Leviathan on Sept. 6 for a sojourn in France, Germany and Belgium.

J. S. Vrabek, formerly sales manager of the Sturtevant Mill Co., has become sales manager of the McGann Mfg. Co., with headquarters at Hudson Terminal, 50 Church Street, New York. For seven years he was western sales manager of the Sturtevant company, to which he went after leaving the sales and engineering department of Allis-Chalmers Mfg. Co.

T. C. Thomas of Youngstown has been appointed superintendent of the plant at Evanston, Ill., of the Youngstown Sheet & Tube Co. He has heretofore been superintendent of the company's machine shops in the Youngstown district.

President James A. Campbell of the Youngstown Sheet & Tube Co. has returned to his desk at Youngstown following an inspection of the company's ore properties in northern Michigan, Minnesota and Wisconsin. Mr. Campbell made the trip with representatives of the Bethlehem Steel Corporation and officers of Pickands, Mather & Co., operators of the ore holdings of the Sheet & Tube and Bethlehem companies.

William Breeden has been appointed Southern California representative of Rolph, Mills & Co., San Francisco, in the sale of pig iron, steel and coke, and will have headquarters at Los Angeles. His present address is 5214 Melrose Avenue, Los Angeles. Mr. Breeden was district sales manager of the Lackawanna Steel Co. at Philadelphia for many years and in 1920 became general sales manager of the company at Buffalo, this connection continuing until the purchase of that company by the Bethlehem Steel Corporation.

E. R. Anderson, for the past six years a member of the sales force of the Hendey Machine Co., with headquarters at Chicago, and for three years prior to that identified with the E. L. Essley Machinery Co., Chicago, has joined the sales organization of the Stocker-Rumely-Wachs Co., Chicago, and will travel in northwestern Illinois, Wisconsin and part of the Chicago metropolitan district.

A. P. Scripture, for the past nine years in the tool steel business with offices at 258 Broadway, New York, has left by automobile on an extended fishing trip and intends to visit places of interest in the United States and Canada. He expects to be gone for about a year.

E. M. Bassler, Jr., for the past 12 years connected with the Bayley Mfg. Co. as purchasing agent, has become connected with the Electrical Machinery Co., Milwaukee.

William La Coste Neilson, vice-president and general sales manager Norton Co., Worcester, Mass., has returned from a business tour of the larger European countries. He reports business in France as good, and in England as improving. English business men, he says, view the Dawes reparation plan without enthusiasm, yet with satisfaction, because a majority of them believe it is a solution to a great problem.

R. Sanford Riley, Riley Stoker Co., Ltd., Boston and Worcester, Mass., has returned from an extended European trip. In 1919, he visited the Lens district in France, which at that time was experiencing a business depression. Today, he says, plants in that district are thoroughly equipped with modern equipment and the mines operate practically at capacity.

Robert T. Kent, editor of Kent's Mechanical Engineers' Handbook, has been appointed to the newly created position of superintendent of prison industries for New York State. Associated with the late Frederick W. Taylor in scientific management work, he has been prominently identified for some time, largely in a consulting capacity, in factory management problems. He recently returned from the Czechoslovakian Congress on Management at Prague, where he took a leading part.

William H. Price has been appointed sales manager of the Sharpsville Furnace Co., Pittsburgh. He has been identified with the Allen S. Davison Co., owner and operator of the Sharpsville Furnace Co., for the past 10 years, most of that time as purchasing agent.

William H. Allen, formerly with the Kearney & Trecker Corporation, Milwaukee, has become identified with the Fellows Gear Shaper Co., Springfield, Vt., as traveling consulting and sales engineer.

Samuel G. Eastman, for many years identified with the Pratt & Whitney Mfg. Co., and latterly manager of the Chicago sales office of that organization and the Niles-Bement-Pond Co., has been elected president of the Belvidere Screw & Machine Co., Belvidere, Ill.

OBITUARY

EDWARD T. CARTER, Plainville, Conn., died of acute indigestion on Aug. 30, at Belmont, Vt., while on vacation there. Mr. Carter was born in New Haven, Conn., 69 years ago. In 1902 he took over the brass and bronze casting business established by his father and had maintained it since.

AARON JACOBS, aged 56 years, secretary of the American Foundry & Machine Co., Hamilton, Ohio, died at his home in Hamilton on Sept. 5. Mr. Jacobs was one of the founders of the company. He became identified with the Mosler Safe Co. in his youth, but left the firm in 1900 and assisted in founding the company he served at the time of his death.

RICHARD B. CHARLTON, general manager of the Bay View Works, Illinois Steel Co., at Milwaukee, died Sept. 5, after an illness of six months, from the effects of malaria contracted during a vacation in Florida last winter. He was born in New York on Oct. 10, 1864, and upon graduation from Rensselaer Polytechnic Institute at Troy, went to Milwaukee, entering the employ of the Bay View mills as a common laborer in 1893. He was appointed general superintendent in 1904 and general manager in 1907. A son, Alexander Charlton, is now mill superintendent. Mr. Charlton also was vice-president of the Wrought Washer Co., Milwaukee.

GEORGE T. ROBERTS, formerly treasurer of the Eastern Concrete Steel Co. until his retirement a few years ago, died last week at his home, 17 Anderson Place, Buffalo, aged 52 years.

WILLARD C. LIPE, until recently vice-president of the Brown-Lipe Gear Co., Syracuse, N. Y., died on the evening of Sept. 4 at Tacoma Park Sanitarium near Washington. He was 63 years of age. Mr. Lipe was one of the founders of the gear industry in Syracuse, having begun in the manufacture of bicycles and later turning to automobile transmission and differential gears.

CANADIAN PIG IRON

Market Shows Moderate Improvement, with Prices Firmer

TORONTO, ONT., Sept. 8.—After a stagnation of about eight months business in the Canadian pig iron market is beginning to show signs of improvement. During the past week or two melters have been appearing in the market much more frequently than formerly and order for spot and future delivery are running into larger tonnages. While foundry activities have not improved to the extent expected earlier in the year, new business is beginning to appear in greater volume. During the quiet period many melters allowed their pig iron stocks to almost disappear and took to the hand-to-mouth buying policy which was continued throughout the greater part of this year. Now that the iron and steel trade appears to be on the eve of general improvement, future buying is again featuring the market and as a consequence within the past two or three weeks a number of larger consumers have come forward with inquiries for last quarter and a few have placed orders for their entire winter requirements.

In the Montreal market inquiries are out for about 5000 tons in addition to business already closed. Under existing conditions and prices Canadian furnace operators in some cases are not pushing the sale of future iron, while others are accepting all the business offered and are offering iron for first quarter of 1925.

The production of pig iron has been steadily declining for the past two months, but despite this fact there is no shortage in the Dominion; in fact, furnaces have large stock piles. At present but three blast furnaces are blowing as follows: Steel Co. of Canada, Hamilton, Ont., one; Algoma Steel Corporation, Sault Ste. Marie, Ont., one, and the British Empire Steel Corporation, Sydney, N. S., one. The British Empire Steel Corporation is proving a strong competitor in the Ontario market, as it has already shipped several cargoes from Sydney into this district and others will arrive before the close of navigation.

Pig iron prices, while unchanged, are showing a much stronger tendency and predictions of advances of from 50c. to $1 per ton are frequently made. The prevailing prices of pig iron in the Canadian market are the lowest since 1916, being as follows: No. 1 (2.25 to 2.75 silicon), $25.80; malleable, $25.80; No. 2 (1.75 to 2.25 silicon), $24.80, Toronto. No. 1 and malleable, $27.70; No. 2, $26.70, Montreal. Imports of pig iron into this market have been comparatively light throughout the greater part of this year and at present only small tonnages of special grade iron are reported from United States producers. British producers are shipping little iron into the Montreal district and it is reported that so far there is little Summerlee or Carron iron laid by for winter sale.

Detroit Scrap Market

DETROIT, Sept. 9.—While sales have not been heavy and mostly in small lots during the past week, dealers in old material are feeling decidedly better with the market showing a firmer tone as registered by the pig iron market during the past few weeks. Prices on practically all materials have advanced 50c. per ton.

The following prices are quoted on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting steel	$15.00 to $15.50
Shoveling steel	15.00 to 15.50
Borings	12.00 to 12.50
Short turnings	11.50 to 12.00
Long turnings	10.50 to 11.00
No. 1 machinery cast	16.00 to 17.00
Automobile cast	18.00 to 18.50
Hydraulic compressed	12.75 to 13.25
Stove plate	14.00 to 14.50
No. 1 busheling	12.50 to 13.00
Sheet clippings	8.50 to 9.00
Flashings	11.00 to 11.50

MISSION TO MEXICO

Organized by American Manufacturers Export Association and Now on Way

An American industrial mission to Mexico organized by the American Manufacturers Export Association left New York Sept. 9 for a sojourn in Mexico, traveling by rail through Pittsburgh, St. Louis and across the border at Laredo. It was headed by W. W. Nichols, Allis-Chalmers Mfg. Co., Inc., president of the association. Among others in the party were:

Thomas A. De Vilbiss, Toledo, Ohio; William B. Read, Edward G. Budd Mfg. Co., Philadelphia; A. E. Hertzig, Goodyear Tire & Rubber Co., Pittsburgh; Harrington Emerson, Emerson Engineers, New York; Henry Torrance, Carbondale New York Co., New York; E. V. Brigham and C. A. Miller, Kalamazoo Sanitary Mfg. Co., Kalamazoo, Mich.; W. P. Gage, Pure Oil Pipe Line Co. of Texas, Dallas, Tex.; Julius Goslin, Joubert & Goslin Machine & Foundry Co., Birmingham; J. E. La Dow, Mansfield Tire & Rubber Co., Mansfield, Ohio; Calvert Townley, Westinghouse Electric & Mfg. Co., New York; Charles B. Davis, International General Electric Co., Schenectady, N. Y., and George F. Bauer, National Automobile Chamber of Commerce, New York.

Dinner in Honor of President Campbell

YOUNGSTOWN, Sept. 8.—An anniversary dinner has been arranged in the Country Club of Cleveland on Thursday evening to celebrate the seventieth birthday of President James A. Campbell, of the Youngstown Sheet & Tube Co. Leading steel makers of the country have been invited to honor Mr. Campbell, among them Judge Gary, Charles M. Schwab and John A. Topping.

A. E. Adams and E. L. Ford, of Youngstown, and Samuel Mather of Cleveland have arranged the testimonial.

The Structure of Troostite and Sorbite

(*Continued from page* 617)

the same components will result in greater softness. Troostite, as shown here, agrees with this, for it is merely an agglomeration of the same components, ferrite and cementite, that were present in the martensite, and is much softer than the martensite.

Sorbite is a more complete stage of the agglomeration of the ferrite and cementite than the troostite was. The disperse particles of free Fe_3C are much larger and more numerous here than they were in the troostite. The natural brittleness of the free Fe_3C present is neutralized for it is closely associated with layers of ductile Ferrite.

Summary

1. Using the method of etching described here, present day microscopes have sufficient resolving power at 1000 dia. to show the structure of troostite and sorbite.

2. Troostite and sorbite contain free crystallized Fe_3C in amounts increasing with the drawing temperature.

3. Troostite is an agglomerated solid solution of ferrite and cementite containing a few particles of free cementite.

4. Sorbite is composed chiefly of free cementite and ferrite, with very little of the cementite remaining in solid solution.

References

1. With the exception of the specimen used in Figs. 1 and 2, which was quenched from 1580 deg. Fahr. and not drawn.

2. Archer, *Trans.*, A.I.M.E., vol. 62, p. 754 (1920).

3. Pulsifer and Greene, "Structure of Chromium-Nickel Steel," *Chemical and Metallurgical Engineering*, vol. 28, No. 8, p. 354 (1923).

4. Maurer, Mitt. Kaiser Wilhelm Inst., Eisenforsch 1, p. 39 (1920).

Steel Treaters' Week at Boston

(*Continued from page* 628)

hardening furnace. Oven chamber, 10 in. wide, 15 in. deep, for continuous temperatures up to 1700 deg. Fahr., for use principally in tool rooms and machine shops and for odd jobs. A No. 3 model "RR" Eaton electric rotary tempering furnace, for large production of small parts, such as lock washers, drills, bobbin rings, springs (flat and coil), etc.; size of loading container, 36 in. deep, 14 in. in diameter; for temperatures up to 800 deg. Fahr. A small working model of No. 1 model "J" furnace for demonstrating the method of replacing heating coils when required. In attendance: H. B. Eaton, sales manager; Murray Winter, treasurer, and A. A. Harvey, engineering department.

CHARLES ENGELHARD, INC., New York. Section A, booth 66. Automatic control for gas and electric furnaces. Indicating and recording pyrometers. Thermo-couple mountings for plant and laboratory work. A new development in recording pyrometer instruments. In attendance: R. W. Newcomb, E. S. Newcomb, J. H. Allison, M. K. Epstein and C. W. Hubbard.

F

FEDERAL MACHINE & WELDER CO., Warren, Ohio. Section B, booth 92. An electric butt welding machine; also samples of various size steel for demonstration. In attendance: F. P. McBerty, Z. A. McBerty, A. V. B. Cutler and Albert E. Hackett.

FIRTH-STERLING STEEL CO., McKeesport, Pa. Section B, booths 135 and 145. Blue Chip high-speed steel tools. Miscellaneous tools. Stainless steel and stainless iron articles. Globe drill rods and bright stainless strips. In attendance: E. E. Roberts, A. Mattson, O. T. Smith, J. F. Higgins, H. I. Moore, F. Miller, A. E. Barker, E. T. Jackman, R. F. Kimber, A. C. Leete and D. G. Clark.

FITCHBURG MACHINE WORKS, Fitchburg, Mass., and Seneca Falls Machine Co., Seneca Falls, N. Y. Section C, booth 250. Lo-Swing lathes and Star lathes. Short-cut production lathes. In attendance: E. R. Smith, vice-president, and others.

J. B. FORD CO., Wyandotte, Mich. Section A, booth 25. Wyandotte cleaning materials. In attendance: B. N. Goodell, E. K. White, F. S. Du Gray and J. W. English.

G

WILLIAM GANSCHOW CO., Chicago. Section A, booth 49. Ganschow speed transformers, types "A," "B" and "C." Worm gear drives. Commercial line of gears and heat treated gears. In attendance: A. F. Boissoneau.

GATHMANN ENGINEERING CO., Baltimore. Section B, booth 104. Ingot molds and samples of ingots. In attendance: Emil Gathmann.

GENERAL ELECTRIC CO., Schenectady, N. Y. Section B, booths 90 and 91. Three electric furnaces for heat treating of steel. A small display of immersion units and space heaters. In attendance: D. G. Brokaw, L. A. McKenney, L. C. Rossear, J. F. McFarlane, C. L. Ipsen, A. N. Otis, E. F. Collins, W. A. Gluesing and L. W. Shugg.

GENERAL FURNACE CO., Philadelphia. Section B, booth 109. Continuous electric heat treating furnace (15 x 4 x 6 ft.) In attendance: Horace Drever, Frank Hodson and G. C. Garland.

GENERAL WELDING & EQUIPMENT CO., Boston. Section B, booth 149. An automatic shape cutting machine with a cutting range of 12 x 3 ft. This machine is built for cutting heavy machine parts, such as connecting rods, side rods, crankshafts, frames, rudder posts, etc. An automatic circular plate cutting machine for cutting large discs, rings, washers, etc. This machine is portable and is set direct in the center of the plate to be cut. Also the company's standard line of welding and cutting equipment. In attendance: Dr. A. Krebs, Thomas F. Stoddard, Daniel A. Lee, Carlos Krebs, Miss M. M. Krebs, J. J. Lee, R. B. Guptill and Arnold White.

GEOMETRIC TOOL CO., New Haven, Conn. Section C, booth 208. Self-opening and adjustable die heads; self-opening and adjustable rotary die heads and solid adjustable die heads. Adjustable collapsing taps; adjustable collapsing rotary taps and solid adjustable taps. Geometric chaser grinder. Geometric threading machine. Adjustable hollow milling tools. Jarvis high-speed tapping devices. Jarvis friction drive tapping device. Jarvis quick change chucks and collets. Jarvis self-opening stud setters. Specimen threads. Photographs. In attendance: G. A. Denison, sales manager; G. T. Case, F. W. Gowrie, J. E. Bullock, E. L. Wood, F. A. Barker.

GENERAL ALLOYS CO., Boston. Section A, booths 12 and 22. Q-Alloy heat treating containers, boxes, pots, retorts and castings. In attendance: H. H. Harris, president; E. P. Van Stone, W. K. Leach and A. L. Grinnell.

GISHOLT MACHINE CO., Madison, Wis. Section C, booth 197. Precision balancing machine for rotative parts. Also a running test stand to show the effects of unbalance on rotating part. Also photos of complete line of machinery and tools. In attendance: E. S. Chapman, F. M. Nelson, Z. E. Thomas and R. D. Heflin.

GODDARD & GODDARD CO., Detroit. Section B, booth 167. Standard and special milling cutters. Railroad channelling, slabbing cutters, helical mills and reamers. In attendance: A. N. Goddard, president; C. H. Wallace, special railroad demonstrator, and Dix Proctor, New York office.

GOSS & DE LEEUW MACHINE CO., New Britain, Conn. Section C, booth 221. A four-spindle automatic chucking machine. In attendance: E. H. Peck, J. J. Spring and S. T. Goss.

GOULD & EBERHARDT, INC., Newark, N. J. Section C, booth 221. A 32-in. shaper with 12 new features, some of them being: Centralized multiple gravity oiling system for lubricating all main internal bearings, including pulley bearing; a simple and efficient lock for tool head slide gear shift lever for shifting gears in speed case has been moved to new convenient location at top of case; ram handle made of drop forging; a sheet metal guard over the cross-rail with provision to prevent chips from getting under and in back of the slide. A No. 16 H. S. manufacturing hobbing machine with slight swivel to cutter spindle for handling a diversified range of spur gears only within the capacity of the machine. In attendance: A. Miller, H. W. Jacobson and F. G. Eberhardt.

GUNN MFG. CO., Boston. Section B, booth 143. Gunn hose clamp tool. In attendance: R. N. Gunn, president, and others.

H

GEORGE J. HAGAN CO., Pittsburgh. Section B, booth 108. A new and improved type of tool room furnace, electrically heated and automatically controlled. Complete photographs and descriptions of installations of furnace equipment heated by oil, gas, coal and electricity. Display of oil and gas burning equipment for all industrial heating purposes. In attendance: J. E. Randall, P. A. Meyer, G. T. Thatcher, R. E. Talley, C. F. Cone, R. L. Corbell and A. D. Dauch.

HALCOMB STEEL CO., Syracuse, N. Y. Section A, booth 50. Various tools made from different grades of tool steel and automobile parts made from Halectralloy brand; alloy steels and heat and rust resisting alloys. H. J. Stagg, manager; M. P. Spencer, assistant sales manager; S. C. Spalding, metallurgist; R. Atkinson, J. T. Leyden, L. D. Hawkridge, J. F. Kirwan, E. F. Talmage, H. D. Evans, J. H. Hinkley, A. Schroeder, F. W. Ross, E. L. Reed, J. E. McGregor and T. F. Wood.

HAUCK MFG. CO., Brooklyn. Section A, booth 54. Hauck Venturi low pressure burners in four different sizes and Hauck Venturi high pressure burners (steam or compressed air), different sizes. In attendance: F. J. Schwenk, sales manager; Frank Thomson, New England district representative; Jules Escheman, Buffalo district representative, and A. F. Schumann, Philadelphia district representative.

C. I. HAYES, Providence, R. I. Section B, booth 102. Electric furnace (annealing, hardening, etc.); electric temper drawing furnace; automatic temperature control and safety control for electric furnace to prevent overheating and accidental burnout. In attendance: C. I. Hayes, chief engineer; J. E. Hines, sales manager, and A. E. Bernier.

HEALD MACHINE CO., Worcester, Mass. Section C, booth 209. Cylinder grinding machine, internal grinding machine, automatic rotary surface grinding machine and magnetic chucks. In attendance: R. A. Heald and Robert M. Lippard.

HEIM GRINDER CO., Danbury, Conn. Section C, booth 252. Heim centerless grinding machine. Also samples of work ground on the centerless machine. In attendance: Robert Krametz.

HENDEY MACHINE CO., Torrington, Conn. Section C, booth 241. Hendey 14 x 6 model E. B. M. motor driven engine lathe. Hendey 24-in. motor driven crank shaper. Hendey No. 2 all geared universal milling machine, motor driven. In attendance: A. H. Hall, sales manager, and E. W. Bersler.

HEPPENSTALL FORGE & KNIFE CO., Pittsburgh. Section A, booth 57. Various drop forgings which have been manufactured from the company's die blocks and which forgings are considered more or less perfect. In attendance: C. W. Heppenstall, A. J. Porter, Jr., C. J. Sauer, H. P. Jones, A. L. Worster and Floyd Rose.

HIGH SPEED HAMMER CO., Rochester, N. Y. Section C, booth 204. Full line of High Speed riveting hammers, and model "E" High Speed sensitive drill press. Three sizes

of hammers, No. 1-AA, 3-A heavy duty, and 6-b Bolster type, practically demonstrated. In attendance: E. F. Meyering, H. A. Moore and H. C. LeVine.

HOSKINS MFG. CO., Detroit. Section B, booth 115. An electric heat-treating furnace, having cast heating units of Chromel, equipped with automatic temperature control pyrometer. In attendance: Charles S. Kinnison, G. L. Price, W. D. Little and W. A. Gatward.

E. F. HOUGHTON & CO., Philadelphia. Section A, booth 63. Carburizing materials and other metal working products, including leather belting and packing. In attendance: Herbert Lloyd, Charles Schultz, Walter A. Buechner, David J. Richards, George W. Pressell and others.

HUNTER SAW & MACHINE CO., Pittsburgh. Section B, booth 131A. Inserted tooth saws; solid saws for all makes of metal cutting sawing machines; hot saws; tube saws; high-speed metal cut off saw and friction discs. Saw sharpening and beveling machines. Inserted saw grinders. Inserted tooth setting up device. Device for dressing friction discs. Circular shear knives. Rotary pipe cutters. Circular paper and cigarette knives; circular cork knives and circular rubber knives. Various hardened steel specialties. Pneumatic hammer rivet sets and chisel blanks. In attendance: H. S. Hunter, F. A. Hunter and Carl Schnubel.

I

ILLINGWORTH STEEL CO., Philadelphia. Section B, booth 118. Samples of rolled steel; heat treated and finished dies. Manufactured products resulting from our materials.

INDUSTRIAL GAS EQUIPMENT CO., New Haven, Conn. Section A, booth 5. Reeves gas-air pre-mixing installation. Reeves Venturi Inspirators, furnaces, special burners. In attendance: F. I. Newton, David Dibbell and Charles A. Drum.

INTERNATIONAL NICKEL CO., New York. Section A, booths 13 and 23. Samples of nickel steel and nickel steel products for various industrial uses. In attendance: P. D. Merica, Charles McKnight, Jr., Thomas H. Wickenden and L. Muller-Thym.

J

WILLIAM JESSOP & SONS, INC., Boston. Section D, booth 171-B. Booth for reception. In attendance: F. C. A. H. Lantsberry, Sheffield, England; J. T. Wood, New York; J. M. Curley, Boston.

JONES & LAMSON MACHINE CO., Springfield, Vt. Section C, booths 211 and 217. Hartness flat turret lathe (15-in. chucking machine). Two Fay automatic lathes. Hartness screw thread comparator. Hartness automatic dies. Flanders ground thread taps. In attendance: H. S. Beal, assistant general manager; B. L. Billings, sales representative for New England, and J. L. Lovely, chief engineer Fay automatic lathe division.

JONES & LAUGHLIN STEEL CORPORATION, Pittsburgh. Section A, booth 44. Various steel products of interest to those in attendance at this convention. In attendance: A. A. Wagner, A. B. Marble and others.

K

KARDEX CO., Tonawanda, N. Y. Section B, booth 174. Kardex filing systems. In attendance: C. F. McKee, Boston district manager.

KELLER MECHANICAL ENGINEERING CORPORATION, Brooklyn. Section C, booth 221. Keller type E-5 automatic die-sinking machine. Machine is electrically controlled and duplicates in the die block the form of a soft master or pattern. Keller type R-6 Universal cutter and radius grinder. Keller type BK flexible shaft grinder on bench. Keller type BK-2 flexible shaft grinder on roller floor stand. Samples of dies, molds, etc., cut on Keller machines, and the work produced by these dies. In attendance: S. A. Keller, Jules Dierckx, Henry Schreiber, Charles A. Mertens, M. Mayer and C. J. Priebe.

KEYSTONE LUBRICATING CO., Philadelphia. Section A, booth 24. Keystone safety lubricating system, both hand operated and with the Keystone automatic converter cup. In attendance: H. A. Buzby, L. A. Webster, G. W. Hall, C. O. Norstrum, C. H. Stone, H. J. Kass, C. H. Tholl, F. D. Street.

KING REFRACTORIES CO., INC., Buffalo. Section A, booth 38. A bulletin machine. High temperature cements. "Mono" baffles and fire brick. In attendance: S. C. Smith, F. B. Lythgoe and M. F. Tenny.

KOBERT MACHINE CO., Wooster, Ohio. Section C, booth 221. Kobert electrical riveting machines. In attendance: F. C. Kobert.

L

LEEDS & NORTHRUP CO., Philadelphia. Section B, booths 101 and 114. Potentiometer pyrometers, including indicating, recording and controlling equipment. Hump electric hardening furnaces and electric drawing furnaces. Also some special demonstrations pertaining to heat treatment. In attendance: Henry Brewer, G. W. Tall, Jr., E. B. Estabrook, Oscar Brewer, T. C. Smith, W. A. Lane, Jordan Korp, J. W. Harsch, H. N. MacMichael and E. H. Carlson.

E. LEITZ, INC., New York. Section A, booth 56. Latest design micro-metallograph, recently placed upon the market. New grinding and polishing machines for metal specimens, metallurgical microscopes and photographic apparatus of simple design, as well as a complete assortment of accessories used in connection with metallurgical work. Also an ore dressing microscope. In attendance: A. Bader, A. Buehler and Mr. Zieler.

LEWIS-SHEPARD CO., Boston. Section E, booth 116. Jacklift and singlelift elevating trucks. Lewis-Shepard steel leg platforms and Lewis-Shepard stackers or portable elevators. In attendance: G. E. Squier, sales manager.

LODGE & SHIPLEY MACHINE TOOL CO., Cincinnati. Section C, booth 221. Duomatic lathe for the advantageous use of multiple tooling in turning and facing operations; particularly adapted to quantity production of lathe work held between centers, on an arbor, or in suitable holding fixtures. The cycle of operation is completely automatic including the locating of diameters and lengths on the work piece. Also the latest type of 12-in. lathes. In attendance: Fred Albrecht, sales manager, and Earl M. Wagner, Eastern representative.

LUDLUM STEEL CO., Watervliet, N. Y. Section B, booths 148 and 160. Tool steel and special alloy steels, high-speed steel and non-corrosive and heat resisting steels, showing shapes, sizes and conditions of treatment in which they are supplied, together with interesting steps in their manufacture. In attendance: V. S. Yarnell, assistant to the president; W. H. Vrooman, assistant manager of sales; C. B. Templeton, Jr., sales department; A. A. Colebrook, New York manager of sales; G. F. Wilson, Philadelphia manager of sales; E. R. S. Reeder, Boston manager of sales; S. T. Pearsons, W. L. Weaver, Albany territory; J. E. Moyer, Millersburg, Pa.; J. E. Polhemus, Detroit manager of sales; W. A. Edwards, Chicago manager of sales, and T. C. Sherman, Cleveland manager of sales.

LYND-FARQUHAR CO., Boston. Section C, booths 237 to 242, and 243 to 245. Machine tools made by the following companies: American Tool Works, Cincinnati; Charles G. Allen, Barre, Mass.; Cochrane-Bly Co., Rochester, N. Y.; Rockford Milling Machine Co., Rockford, Ill.; A. C. Campbell Co., Inc., Bridgeport, Conn.; Monarch Machine Tool Co., Sidney, Ohio; Wilmarth-Morman Co., Grand Rapids, Mich.; Heim Grinder Co., Danbury, Conn.; G. S. Blakeslee & Co., Chicago. In attendance: Various representatives from above companies.

M

P. F. MCDONALD & CO., Boston. Section B, booth 107. Macco Fagersta Swedish tool steel, carbon, chrome tungsten, vanadium, oil-hardening non-shrinkable, spindle steel, cutlery sheets, die-blocks and special sections. Macco Sandviken Swedish cold rolled French finished annealed tool steel, blue tempered, straw tempered and bright tempered. In attendance: M. M. McDonald, sales manager; N. L. Schuver, J. W. Morrissey, I. L. Bambrick and C. W. Greene.

MIDVALE CO., Nicetown, Philadelphia. Section B, booth 141. Hardened and ground chrome steel rolls. Finish ground tool steel bars. Shock resisting alloy steels. Various cutters manufactured from Midvale extra high-speed drill steel. Stuart Hazlewood, vice-president; H. E. Rowe, in charge of exhibit; W. A. Miller, New York district manager of sales; W. B. Smyth, Cleveland district manager of sales; T. G. Besom, New Haven, Conn.; C. M. Smith, Boston; J. W. Walsh, and Henry Ziesing, Philadelphia.

MOLINE TOOL CO., Moline, Ill. Section C, booth 221. Multiple spindle straight line drilling machine drilling work for textile machine manufacture. In attendance: W. P. Hunt and H. D. Gentry.

MONARCH MACHINE TOOL CO., Sydney, Ohio. Section C, booth 237. A 16 in. by 6 ft. Monarch quick-change-gear lathe equipped with 8-speed geared headstock arranged for motor drive. An 18 in. by 6 ft. Monarch geared-head manufacturing lathe having 4-speed head, 4 changes of feed, designed for machining large quantities of duplicate parts. A 26-in. Whipp open side crank shaper planer arranged for motor drive. In attendance: W. E. Whipp, general manager and secretary-treasurer.

MORSE TWIST DRILL & MACHINE CO., New Bedford, Mass. Section B, booth 140. Drills, reamers, cutters, taps, dies, arbors, chucks, mandrels, sockets, sleeves and taper pins. In attendance: W. T. Read, vice-president.

N

NATIONAL AUTOMATIC TOOL CO., Richmond, Ind. Section C, booth 221. Natco multiple spindle drilling and tapping machinery. Also universal joints, tap holders, tool holders, straight shank drill holders and drill heads. In attendance: F. D. Shriver, sales representative; H. A. Fuller, service representative, and E. D. Frank, sales manager.

NATIONAL TWIST DRILL & TOOL CO., Detroit. Section A, booth 46. Complete line of twist drill, reamers, hobs, cutters, counterbores, combined drill and countersinks and special tools. Also "7716" drills and parabolic milling cutters. In attendance: H. Butler, assistant sales manager.

NATIONAL ELECTRIC LIGHT ASSOCIATION. Section B, booth 93. Pictures, drawings and photographs. In attendance: W. H. Sammis, and others.

NEW BRITAIN MACHINE CO., New Britain, Conn. Section C, booth 220. Exhibiting (in operation): A No. 454 New Britain New-Matic chucking machine. In attendance: H. H. Pease, president; R. S. Brown, secretary and chief engineer; E. L. Steinle, manager machinery sales; R. T. Frisbie, manager screw products department; Arno Schubert, F. R. Downs, New England representative; C. A. Doherty, demonstrator, and R. Hulbert purchasing agent.

NEW ENGLAND ANNEALING & TOOL CO., South Boston. Section A, booth 48. Samples of drop forgings and specimens of heat treating. In attendance: Z. L. Sault and Raymond G. Sault.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS, Boston. Section B, booths 137 and 147. Photographs and descriptive matter regarding the gas industry in general, and the application to gas for steel treating. In attendance: P. J. LaFore, John L. Tudbury and others.

NORTON CO., Worcester, Mass. Section B, booth 170. Alundum grinding wheels, crystolon grinding wheels. Norton refractory ware. Norton floors. In attendance: C. W. Sawe, Robert Kirkpatrick, R. P. Capron and J. S. Rose.

R. D. NUTTALL CO., Pittsburgh. Section B, booth 142. Various types of hardened gears, and especially gearing and other wearable machine parts that have been hardened and toughened by the company's BP process. In attendance: R. F. Fiske, J. E. Mullen and W. H. Phillips.

O

OHIO MACHINE TOOL CO., Kenton, Ohio. Section C, booth 213. A 36-in. Ohio dreadnaught shaper. In attendance: C. C. Swift and L. H. Peters.

OHIO STEEL FOUNDRY CO., Springfield, Ohio. Section B, booth 96. Fahrite castings for resistance to heat and corrosion. Also small electric furnace in operation. In attendance: T. H. Harvey, vice-president; H. G. Shook, manager, alloy division; F. D. Rice and E. L. Malone, Philadelphia representatives, and Edwin R. Knapp, New York representative.

O. K. TOOL CO., Shelton, Conn. Section C, booth 198. Complete line of products, consisting of system of holders and tools for lathes, planers, shapers, boring mills and automatic and special machines. Also the O. K. inserted tool milling cutters including inserted tooth sectional hobs for cutting gears. Grinding machine in operation especially equipped for using O. K. tool blocks for grinding tools. In attendance: George W. Conklin, Frederick Schroeder and Harry L. Taylor.

TINIUS OLSEN TESTING MACHINE CO., Philadelphia. Section A, booth 64. Various types of testing machines, including an Olsen universal testing machine with various attachments and tools for conducting numerous special tests. Various types of Brinell hardness and Olsen hardness testers, as well as the Herbert pendulum hardness tester. In attendance R. B. Lewis and T. Y. Olsen.

OXWELD ACETYLENE CO., New York. Section A, booth 65. Welding steel boiler plate, cutting it into test pieces and pulling these test pieces in a standard Olsen testing machine, thus demonstrating, by 15-min. tests throughout the week, the uniformity and dependability of the oxy-acetylene weld. In attendance: Sidney Wade, publicity department.

P

PANGBORN CORPORATION, Hagerstown, Md. Section B, booths 151 and 152, 163 and 164. Sand-blast barrel, rotary table and small cabinet types; cloth screen dust arrester and exhauster, showing how sand blast equipment can be operated, ventilated and dust entirely suppressed, allowing discharge of the cleaned air into the shop atmosphere. In attendance: Thomas W. Pangborn, president; H. D. Gates, sales manager; George A. Cooley, district sales engineer; Charles T. Bird, district sales engineer; G. H. Kann and H. M. Ream.

PEERLESS MACHINE CO., Racine, Wis. Section C, booth 248. One 13 x 16 in. Peerless gap saw. One 13 x 13 in. Peerless shaping saw. One 6 x 6 in. Peerless shaping saw. In attendance: H. J. Swanson and others.

PENNSYLVANIA PUMP & COMPRESSOR CO., Easton, Pa. Section B, booth 153. Machine supplying air for Pangborn Corporation, exhibit. In attendance: Ward Raymond, vice-president and others.

PITTSBURGH CRUCIBLE STEEL CO., Pittsburgh. Section A, booth 51. Finished and semi-finished carbon and alloy steel products. In attendance: F. B. Hufnagel, president; W. I. McInerney and others.

POTTER & JOHNSTON MACHINE CO., Pawtucket, R. I. Section C, booth 242. A 6C automatic chucking and turning machine. A 2M automatic milling machine and a 24-in. universal shaping machine. In attendance: Norman R. Earle and others.

HENRY PRENTISS CO., New York. Section C, booths 221 to 227 and 228 to 235. Machines and machine tools manufactured by the following companies: Keller Mechanical Engineering Corporation, Brooklyn; O. S. Walker Co., Worcester, Mass.; V & O Press Co., Hudson, N. Y.; Baker Brothers, Toledo, Ohio; Blanchard Machine Tool Co., Cambridge, Mass.; Avey Drilling Machine Co., Cincinnati; Gould & Eberhard, Newark, N. J.; Cincinnati Acme Co., Cincinnati; Cincinnati Planer Co., Cincinnati; Cincinnati Bickford Machine Tool Co., Cincinnati; Cincinnati Milling Machine Co., Cincinnati; Moline Tool Co., Moline, Ill.; Henry G. Thompson Co., New Haven, Conn.; Lodge & Shipley Machine Co., Cincinnati. In attendance: Various representatives from above companies.

PRATT & WHITNEY CO., Hartford, Conn. Section C, booth 196. A 13 x 32 in. model B lathe, motor driven. Show case of complete line of gages and small tools. Fractured and defective small tools. In attendance: Marcus Chase; T. Boyd and M. S. Bradley, Boston; A. H. d'Arcambal, small tool department, Hartford, and A. E. R. Turner, machinery department, Hartford.

R

RACINE TOOL & MACHINE CO., Racine, Wis. Section C, booth 215. Racine high-speed metal cutting machines 4 x 4 to 12 x 12 in. Racine duplex band saw machines. In attendance: J. M. Jones, manager, William C. Reinhardt, superintendent, and possibly others.

REPUBLIC FLOW METERS CO., Chicago. Section A, booth 26. Complete indicating and recording pyrometer equipment with thermocouples, protecting tubes, etc. Complete line of power plant instruments, consisting of CO2 indicators and recorders, draft indicators and recorders, steam, gas, oil and water flow meters, flue gas hand analyzers. In attendance: C. C. McDermott, Jack Morehouse, manager of Boston office, and J. D. Cunningham, president.

RIVETT LATHE & GRINDER CORPORATION, Boston. Section C, booth 207. A No. 103 internal grinder, motor driven, grinding holes in standard collets. No. 106 internal grinder, motor driven, grinding holes in standard collets. No. 505 plain precision lathe. Rivett quality collets. In attendance: E. P. MacCannell and A. L. Hathorne.

W. S. ROCKWELL CO., New York. Section A, booth 30. Operating models (not under heat), photographs, literature, etc. In attendance: J. N. Voltman, J. A. Doyle, C. D. Barnhart and others.

ROCKFORD MILLING MACHINE CO., Rockford, Ill. Section C, booth 244. Milling machines. In attendance: G. A. Mathewson.

RODMAN CHEMICAL CO., Rodman, Pa. Section A, booth 34. Case hardening or carburizing compounds; quenching oils; tempering oils and luting compound. In attendance: Hugh Rodman, general manager; S. P. Rockwell, New England representative; W. D. Fuller, New England representative, and Gordon A. Webb, Detroit representative.

ROESSLER & HASSLACHER CHEMICAL CO., New York. Section A, booth 58. Samples of copper plating for related uses. Collection of case hardening compounds. In attendance: Charles H. Procter, New York; William Gager, Perth Amboy; W. J. Schneider, New York and Boston representatives.

F. J. RYAN CO., Philadelphia. Section A, booth 17. Different types of burners. Model of sectional furnace construction. Automatic control for high and low pressure burners. Photos of types of installations. In attendance: J. L. Edwards, F. A. Hall, G. F. Beach and F. J. Ryan.

S

SHORE INSTRUMENT CO., Jamaica, N. Y. Section B, booth 169. C-1 model scleroscope (bulb type) electrically operated to facilitate quantity production; D model scleroscope

(recording type) improved. A and B model pyroscopes, range 1200 deg. Fahr. to 3000 Fahr. Durometer and elastometer for testing pliable material. Localhard and Localcase for selective hardening. Accessories and fixtures. In attendance: F. G. Kendall and assistant.

SIMONDS SAW & STEEL CO., Fitchburg, Mass. Section B, booths 127 and 128. Metal cutting saws, files, hack saws, carbon and high speed steel sheets and bars. In attendance: H. B. McDonald, C. R. Paffenbach and C. W. McKay.

SKINNER CHUCK CO., New Britain, Conn. Section B, booth 121. Skinner chucks. In attendance: Paul K. Rogers, vice-president.

W. W. SLY MFG. CO., Cleveland. Section B, booths 155 and 156. Two Universal Slyblast mills (20 x 20 in. inside diameter). A Slyblast pressure tank and a 30/48 Slyblast cabinet. In attendance: F. A. Ebeling, sales manager; D. L. Harris, Eastern representative, and D. C. Gilchrist, advertising manager.

SPENCER TURBINE CO., Hartford, Conn. Section A, booth 7. Spencer turbo compressors for supplying air for oil and gas burning industrial furnaces. These machines are of the multi-stage, low-velocity turbine type. In attendance: S. E. Phillips, secretary; H. L. Grossman, sales engineer, and O. J. Dingee, sales engineer.

STEEL CITY TESTING LABORATORY, Detroit. Section B, booth 171A. Power and hand Brinell machines. In attendance: H. A. Weaver.

STROMBERG ELECTRIC CO., Chicago. Section B, booth 133. Various models of Stromberg process timing and signalling instruments. In attendance: Ward N. Hickock and others.

SURFACE COMBUSTION CO. AND COMBUSTION UTILITIES CORPORATION, New York. Section A, booths 15 and 16. Automatic heat treating furnaces. Exhibit showing principle of recuperation. In attendance: Representing Surface Combustion Co., W. M. Hepburn, vice-president; Morris Goodman and A. M. Apmann. Representing Combustion Utilities Corporation, C. B. Phillips.

SWEDISH CRUCIBLE STEEL CO., Detroit. Section A, booth 1. Nickel alloy carbonizing boxes, retorts, tubes, furnace rails, furnace racks, etc. High nickel chromium alloy. Special heat resisting steel—cyanide and lead pots, carbonizing boxes and miscellaneous castings. In attendance: S. R. Allen and H. K. Nixon.

T

TACONY STEEL CO., Philadelphia. Section B, booth 162. Alloy bar steel, forgings, die blocks, piston rods and trimmer steel. In attendance: H. A. Baxter, vice-president, and C. G. Fallon, Boston district sales manager.

HENRY G. THOMPSON & SON CO., New Haven, Conn. Section C, booth 221. A new Milband cutting-off machine. In attendance: Thomas A. Hyde and William Neville.

THOMSON ELECTRIC WELDING CO., Lynn, Mass. Section B, booth 97. Butt welder electrically welding steel bars. Spot welder electrically welding steel sheets. In attendance: M. G. Littlefield, L. S. Taylor and R. M. Taylor.

U

UNION TWIST DRILL CO., Athol, Mass. Section C, booth 216. Milling cutters, metal slitting saws, hobs, special cutters, reamers, twist drills, taps, dies, tap wrenches and die stocks. One revolving case driven by 1/10 hp. motor, 110 volts, 60 cycle. In attendance: J. H. Horigan; J. W. Rathbun, George F. Holland, W. E. Horsfield and Lawrence H. Lathe.

UNITED ALLOY STEEL CO., Canton, Ohio. Section A, booths 31 and 32. Articles and data in connection with the application of open hearth and electric furnace alloy steels. In attendance: H. H. Pleasance, vice-president, F. W. Krebs, J. G. Bell and A. W. Minuse.

V

VANADIUM ALLOY STEEL CO., Latrobe, Pa. Section A, booth 62. Steel samples showing the different stages in processing a bar from the ingot to the finished stock. Finished tools showing the many different uses of tool steels. In attendance: J. P. Gill and L. D. Bowman of Latrobe, Pa.; D. A. Black, Boston; E. B. Kitfield, Wallingford, Conn.; R. L. Daull, Cleveland; A. F. MacFarland, Detroit; A. F. Chilcott, Buffalo, and J. A. McKay, New York.

VANADIUM CORPORATION OF AMERICA, New York. Section A, booth 67. Attract-O-Scope, showing lantern slides of mining and shipping vanadium ore in Peru, etc.; also specimens of vanadium ore and ferro vanadium. In attendance: M. G. Baker, vice-president; J. A. Miller, Jr., H. T. Chandler and G. L. Norris.

V. & O. PRESS COMPANY, Hudson, N. Y. Section C, booth 221. A No. 3 standard inclinable press equipped with die and stock reel. A No. 201½ combination threading and trimming machine equipped with chucks for performing threading, trimming and knurling in a single operation. This machine also equipped with an automatic chute feed. In attendance: F. M. Ironside and others.

VULCAN CRUCIBLE STEEL CO., Aliquippa, Pa. Section B, booth 172. Tool steels (high-speed, alloy and carbon), and special steels. Materials used in their manufacture and tools and parts made from them. In attendance: S. G. Stafford, president; R. M. Kelso and A. D. Beeken, Jr., Aliquippa, Pa.; A. Hartel, Jr., G. H. Burnett, O. R. Hartel, A. Hartel, III, and Charles E. Karle, Boston; Leo D. Sullivan, Detroit; T. S. Hanna, New York, and G. L. Kronfeld, Pittsburgh.

W

WALCOTT LATHE CO., Jackson, Mich. Section C, booth 214. New all geared head Low Drive engine lathe and also model cam turning lathe. In attendance: D. G. Kimball, president and general manager, and C. S. Sylvester, factory superintendent.

O. S. WALKER CO., INC., Worcester, Mass. Section C, booth 221. A single stroke surface grinding machine, motor driven. Five magnetic chucks and one set of planer parallels. In attendance: Lawrence G. Drury.

R. WALLACE & SONS MFG. CO., Wallingford, Conn. Section B, booth 173. Wallace silver—showing use of stainless steel knife blades in all grades of Wallace cutlery. In attendance: H. G. Goodwill, R. G. Hall and others.

EDGAR T. WARDS' SONS CO., Boston. Section A, booth 42. Cold drawn steel bars; turned and polished shafting; turned and ground shafting; cold rolled strip steel and flat wire; cold drawn seamless steel tubing; tool steels. In attendance: John Ward, E. T. Corbus, J. A. Parons, W. A. Sandison, W. T. James, M. L. Tebbetts, N. J. P. Helling, W. G. H. Thomson and B. R. Heathcote.

WARNER & SWASEY CO., Cleveland. Section C, booths 228 and 236. Exhibiting (in operation) a 1-A universal hollow hexagon turret lathe, equipped with full chucking equipment and operated on a typical chucking job showing its possibilities. In attendance: E. R. Gardner, manager of New York office; J. A. Craig, service representative, and C. J. Stilwell, domestic sales manager.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh. Section B, booths 93 and 95. Several hearth type electric furnaces; furnace heating units and other equipment. In attendance: W. S. Scott, A. T. Ruttencutter, R. M. Keany and P. H. Grunnagle.

WETHERELL BROTHERS CO., Cambridge, Mass. Section B, booth 154. Steel—bars, blocks, shapes, wire, etc. Products made from various special steels sold. In attendance: F. A. Wetherell, L. H. Wetherell, L. E. Zurbach, R. A. Johnston, L. R. Quigley, L. T. Perry, A. S. Mahen and W. C. Brooks.

WHEELOCK, LOVEJOY & CO., INC., Cambridge, Mass. Section A, booth 27. Hy-Ten alloy steels and their application to special parts. In attendance: A. O. Fulton, F. H. Lovejoy and S. W. Parker from Cambridge office; Edward C. Bartlett, Cleveland; L. P. Needham, Chicago, and E. P. Gaffney, New York.

WHITEHEAD METAL PRODUCTS CO., New York. Section B, booth 136. Electric welding machine; Wilson plastic arc—200 amperes; motor generator, single operator with type "J" control panel. In attendance: William M. Bastable, R. F. Blessington, T. M. Bohen, E. W. Silver and S. Marks.

WILMARTH & MORMAN CO., Grand Rapids, Mich. Section C, booth 237. A No. 1 universal cutter and tool grinder, power feed, motor drive, complete with all attachments, 220 volt, single phase, 60 cycle (⅛, ¼ and ½ hp.) A No. 78 surface grinder, arranged for motor drive, 220 volt, three phase, 60 cycle (2 hp.). A "B" point improved New Yankee drill grinder, 220 volt, three phase, 60 cycle (2 hp.). In attendance: Arthur Williams.

WILSON-MAEULEN CO., New York. Section B, booths 129 and 130. Rockwell direct reading hardness tester including new model 4-B of 12-in. capacity. Recording and indicating pyrometer equipment including new model D tapalog recording pyrometer. Resistance thermometer equipment. New automatic temperature control equipment. In attendance: J. E. Heckel, Boston, and others.

A. H. WOLFF GAS RADIATOR CO., New York. Section A, booth 14. Ideal gas fired boilers (in operation). Wolff gas fired steam radiators and Wolff gas fired pressed steel radiators. Wolffire room heaters, Nos. 4, 8, 18 and 28. In attendance: W. T. Rasch, president; A. A. Higgins, New England representative.

NEW TRADE PUBLICATIONS

Electric Drills.—Van Dorn Electric Tool Co., Cleveland. A new presentation of electric drills achieved in a 60-page booklet, illustrated, and entitled "Higher Holeage." The first chapter is a history of hole making. Starting with the boring and drilling of holes in the earliest periods of man's development, the progress of drilling is related up to the present highly efficient use of the drill in machine tools, electric drills, etc. Another chapter is devoted to the making of holes by electricity, or "carrying the tool to the work rather than the work to the machine." The booklet is of unusual value to anyone interested in the subject of drilling.

Electrical Equipment.—The General Electric Co., Schenectady, N. Y. Illustrated booklet showing fine half tones of some of the important electric equipment turned out at the company's Schenectady works.

Ladles.—Whiting Corporation, Harvey, Ill. Catalog No. 172, superseding No. 161, contains complete description of various types of Whiting ladles, together with tables of standard sizes, also cuts of repair parts and repair part list.

Pig Iron and Steel.—Newton, Chambers & Co., Thorncliffe, near Sheffield, England. Beautifully illustrated book, with stiff paper cover, showing the various features of this company's iron and steel plant. The book includes reproductions in colors of two oil paintings, one a view of the interior of the Thorncliffe iron works and the other a view of the blast furnaces. The book is a notable example of the printing art.

Pumps.—Economy Pumping Machinery Co., Chicago. Leaflets giving information and illustrations of Economy centrifugal vacuum boiler feed pumps; also other types of pumping machinery.

Carbon Products.—National Carbon Co., 30 East Forty-second Street, New York. Loose-leaf booklet featuring carbon and metal graphite brushes, but including also mention of the other carbon products of the company. The book contains a good deal of technical data of interest to users of carbon brushes.

Cold Finished Steels.—Wyckoff Drawn Steel Co., Frick Building, Pittsburgh. First catalog, a 50-page booklet with stiff paper cover of coat pocket size, containing besides descriptions of the company's products, embracing cold die drawn rounds, squares, hexagons, flats special shapes and turned and polished shafting in the various kinds of steel, the uses for cold finished steels, Brinell tables of hardness; decimal equivalents of fractions of an inch; tables of horsepower transmitted by shafting under various speeds and conditions; standard methods for checking analysis; S. A. E. steel specifications; standard classification of extras and the tables of weights per linear foot of rounds, squares, hexagons and flats. Illustrations include an exterior view of the company's plant at Ambridge, Pa.; the assembly racks and shipping facilities; the raw material storage building; special shapes produced by the company; partial views of mill No. 1, the wire drawing and straightening department, the cold saw cutting department and the polishing machines.

Electrical Equipment.—Roller-Smith Co., 233 Broadway, New York. Bulletins Nos. 100, 200, 430 and 550, superseding previous bulletins, and giving data regarding electrical instruments for signal system testing, portable, direct-reading rail bond testers, direct current switchboard instruments, and alternating current and direct current relays.

Milling Cutters.—Ingersoll Milling Machine Co., Rockford, Ill. Illustrated booklet 9 x 12 in., 40 pages, giving data on Ingersoll inserted tooth mill cutters. This booklet is complete and gives half-tone illustrations of all types of milling cutters, with specifications and sizes carried in stock in the company's warehouse at Rockford.

Superheaters.—Superheating Co., 17 East Forty-second Street, New York. Pocket-size booklet on superheaters, locomotive feed water heaters, exhaust steam injectors, boiler feed pumps and pipe coils for all purposes. This is a narrative of the company's progress in the development of various types of superheaters, and a list is given of principal users, which includes some of the steel companies and other large industrial and public utility plants.

Graphic Instruments.—Esterline-Angus Co., Indianapolis. Circular describing company's graphic instruments for power plants.

Instrument Transformers.—Sangamo Electric Co., Springfield, Ill. Bulletin No. 65 gives complete information regarding the various types of transformers made by this company.

Pumping Systems.—Sullivan Machinery Co., Chicago. Bulletin No. 71H gives data on pumping systems and calls particular attention to the Sullivan airlift pumping systems as applied to water supply for industrial or municipal use.

Planer Motors.—The Reliance Electric & Engineering Co., Cleveland. Bulletin No. 2016 gives information on type T Reliance planer motors for reversing service, these motors being especially adapted to heavy duty work. The bulletin contains illustrations of several large planers in various shops driven by Reliance motors of this type.

Motors.—Wagner Electric Corporation, St. Louis. A highly illustrated booklet, 36 pages and cover, featuring the Wagner starterless motor, a feature which was conceived by Wagner designers in 1907. Various advantages of the starterless motors are dwelt upon in detail.

Drop Forge Wrenches.—The Lakeside Forge Co., Erie, Pa. Catalog No. 14 gives illustrations and complete information regarding Lakeside open-end and adjustable wrenches and pliers.

Oil As Fuel.—Booklet published by the Mahr Mfg. Co., Minneapolis, and containing an adaptation of an address delivered by W. N. Horner, president of the company, at the annual meeting of the American Petroleum Institute. The booklet is published in the interest of the American Association of Oil Burner Manufacturers and contains considerable information of value to those contemplating the use of oil as fuel.

Electric Hoists.—Chisholm-Moore Mfg. Co., Cleveland. Bulletin No. 20, 12 pages. Describes electric hoist brought out last year by the Stamp Electric Hoist Co., which later was absorbed by the Chisholm-Moore company. The hoist, which was described in The Iron Age, Jan. 26, 1923, is available in capacities from 500 lb. to 5 tons. Features include compact arrangement, simplicity and accessibility of parts. Illustrations show typical installations and also modifications of the hoist to meet special requirements.

Cranes and Hoists.—Euclid Crane & Hoist Co., Euclid, Ohio. "Euclid Utility," a booklet of 16 pages sets forth the features and the adaptability of the various types of hoists. A page each is devoted to illustrations of the use of the hoists in iron and steel works, foundries, large manufacturing plants, railroads and other plants, extracts from testimonial letters relating to the illustrated installations being also given.

Foundry Equipment.—Tessmer Machine & Tool Co., Detroit. Catalog of 22 pages describes and illustrates plate, machine, heavy-duty and adjustable tub vibrators and vibrator accessories. Sprue cutters, both foot and power driven, and motor-driven sand riddles are shown, as well as the company's M2 tumbling barrel and model P molding bench.

Bending Machines.—James R. Kerlin Co., 222 California Building, Los Angeles. Folder describing Kerlin duplex adjustable bending machine for bending iron bars cold or hot. The machine is hand operated and is intended for small and medium sized work.

Pressed Metal Parts.—Geuder, Paeschke & Frey Co., Milwaukee. Booklet of 24 pages under title of "What Do You Make?" The advantages of using stampings in place of certain forged, cast or wooden parts are briefly reviewed and several intricate stampings employed to advantage are illustrated and described. A brief description of the manufacturing facilities of the company, which has been in the pressed metal field for more than 40 years, is included.

Steel Stools and Shop Equipment.—Angle Steel Stool Co., Plainwell, Mich. Supplement to catalog containing new factory, shop and office equipment in the line of steel stools, chairs, trucks, tables, cabinets, drill racks, etc.

Heating Equipment.—Buffalo Forge Co., Buffalo. "Breezo-Fin" heating units, equipped with a motor-driven fan are described and illustrated. Dimensions are given.

Charts, tables and formulas of general interest are being published in bulletin form twice monthly by the service department of the Crescent Refractories Co., Curwensville, Pa. These bulletins will be furnished on request.

Machinery Markets and News of the Works

ACTIVITY AT CHICAGO

School Purchases Feature Market There but Other Buying Expected

About $1,000,000 Worth of Shop Equipment May Be Bought for Ajax Motor Plant, Racine, Wis.

The Chicago market shows more signs of life than any section of the country. Orders for machine tools are not plentiful anywhere, but the Middle West shows slightly more activity than the East.

The Chicago Board of Education placed orders for 58 engine lathes for a technical high school and will buy 11 lathes for another school. An inquiry is expected shortly for 24 lathes for still another school.

The removal of machine-tool equipment from the plant of the Ajax Motor Co., Racine, Wis., forecasts the purchase of new equipment for this plant. It is understood that fully $1,000,000 will be expended for standard tools and special purpose equipment.

Several Eastern railroads are in the market for tools, and among possible purchasers of the near future are the Delaware, Lackawanna & Western, Lehigh Valley, New York, New Haven & Hartford, Boston & Albany and Bangor & Aroostook. None of the lists is large.

New York

NEW YORK, Sept. 9.

BUSINESS in machine tools has continued dull. Both inquiries and orders are few. The Delaware, Lackawanna & Western Railroad has issued an inquiry for a half dozen tools. The Lehigh Valley has not yet purchased the several tools it recently inquired for. The Gulf, Mobile & Northern Railroad has bought a 36-in. x 10-ft. planer. The Bartlett Hayward Co., Baltimore, purchased a 30-in. x 26-ft. slab miller. The Lehigh Portland Cement Co. bought an 800-lb. steam hammer.

Contract has been let by the Arrow Metal Bed Co., 798 Tenth Avenue, New York, to Walter J. Bond, 511 Broadway, Astoria, L. I., for a three-story plant at Eighth and Washington Avenues, Long Island City, 70 x 100 ft., to cost approximately $60,000.

The Department of Plant and Structures, Municipal Building, New York, has plans under way for the erection of a one and two-story housing, repair and service building, 95 x 195 ft., at 303-17 Delancey Street, to cost approximately $100,000. A similar building, two stories, 80 x 200 ft., will be constructed at 17-23 South Sixth Street, Brooklyn, to cost close to a like amount. Plans for the latter structure also are in progress.

The Reo Motor Car Co. of New York, Inc., 1709 Broadway, has work in progress on a new four-story service building, 100 x 170 ft., at 625 West Fifty-fifth Street, and will use the entire third floor for a machine and repair works. A parts department will be established on the first floor. The structure will cost $100,000 with equipment.

The Secretary, Argentine National Sanitation Works Department, Buenos Aires, Argentina, is taking bids until Oct. 6 for machinery for a hydroelectric generating plant to be constructed at Mendoza, comprising horizontal turbine units, generators and accessory equipment, as well as a quantity of spare parts, as per specifications on file.

The Electric Equipment Division, Bureau of Foreign and Domestic Commerce, Washington, has information regarding a hydroelectric generating plant project now under consideration by the government of Latvia and officials of the city of Riga. It is purposed to build the plant on the Dwina River, with estimated costs varying from $2,500,000 to $7,500,000.

Emery Roth, 119 West Fortieth Street, New York, architect, has plans under way for the construction of a three-story automobile service, repair and garage building on 102nd Street, near Fifth Avenue, estimated to cost $300,000 including equipment.

The Compania Industrial El Potosi, Nueve, Milias, Mexico, has secured a concession from the Federal Government for water power from the Chuviscar River, to be used for the operation of a proposed ore reduction mill, for which plans will be arranged at an early date. The plant, with water power and electric equipment, will cost in excess of $400,000.

The International Motor Co., 24 Broadway, New York, manufacturer of motor trucks and parts, has awarded a general contract to the H. D. Best Co., 949 Broadway, for its proposed two and one-half story service, repair and garage building at Long Island City, to be operated as a factory branch. It will be 200 x 425 ft., estimated to cost $700,000 with equipment. E. E. Seelye is architect and J. H. Musselman, mechanical engineer, both of 101 Park Avenue, New York. George A. Hodges is vice-president and general manager.

John De Hart, 1039 Fox Street, New York, architect, will soon ask bids for the construction of a two-story automobile service, repair and garage building, 70 x 150 ft., on Houston Street, estimated to cost $85,000 with equipment.

The Board of Education, Carteret, N. J., has authorized a call for bids on general contract for the erection of a two and one-half story high school, to include a manual training department, estimated to cost $250,000. George W. Brooks, 168 Madison Avenue, Perth Amboy, N. J., is architect.

The Board of Education, Rutherford, N. J., will take bids on a general contract about Sept. 15 for the construction of a new high school to include a manual training department, estimated to cost $400,000, for which plans have been drawn by Ernest Sibley, Bluff Road, Palisade, N. J., architect.

The City Commission, Orange, N. J., has authorized the purchase and installation of an electric dynamo and accessory equipment at the municipal electric light and power plant.

The Hilton Brass Foundry Co., 371 Boyden Avenue, Hilton, N. J., is planning the purchase of foundry equipment, including jolt and squeeze molding machines, Tabor type, and other primary apparatus.

The Department of Public Works, Newark, has negotiations under way with an oil company, recently organized and name temporarily withheld, for a lease of about 15 acres at Port Newark as a site for the construction of a new oil storage and distributing plant, estimated to cost $300,000 with equipment. Chief Engineer Costello of the department is in charge.

Manual training equipment will be installed in the new junior high school to be erected at Croton-on-Hudson, N. Y., estimated to cost $300,000, for which bids are being asked on a general contract on revised plans. Harvey Stevenson is architect, and H. B. Howland and B. R. Krug, consulting engineers, all of 101 Park Avenue, New York.

The Franklin Creek Refining Co., 114 Fifth Avenue, New York, has acquired the plant of the Lakeside Oil Refining Co., Franklin, Pa., and has plans under way for additions to double the present size. Agitator equipment, transmission and conveying machinery will be installed. C. D. W. Grant is general manager.

The Ideal Window Corporation, 23-31 West Forty-third Street, New York, incorporated with $500,000 capital stock, will manufacture under patents of the Lukens Window Co., Cincinnati, whose assets it has purchased. Manufacturing will be done by contract in various centers over the country. No contracts have been awarded. F. L. Ruddy is president.

The Elk Automotive Tool Corporation, 243 West Seventeenth Street, New York, having taken over the assets of the Elk Machine Tool Co., will continue to manufacture the various precision tools made under the Elk name. Though the plant is complete for now, President J. G. Elken plans to purchase additional machinery soon. The company shortly will be in the market for gray iron castings, cold-rolled steel, ground steel shafting, malleable castings, high-speed and tool steel.

Catalogs Wanted

Bunge Freres, 124 Boulevard de Strasbourg, Havre, France, dealers in factory supplies of all kinds, would like to receive catalogs from American manufacturers with a view to purchasing articles not made in France.

Philadelphia

PHILADELPHIA, Sept. 8.

PLANS have been filed by the Arguto Oilless Bearing Co., 149 West Berkley Street, Philadelphia, for a one-story power house on adjoining property and two additional operating buildings, estimated to cost $60,000, for which a general contract has been awarded to the Robert E. Lamb Co., 843 North Nineteenth Street.

The Philadelphia Rapid Transit Co., Philadelphia, has work in progress on a new car house on 10-acre tract. It will include a machine repair shop, a one-story inspection shop, main car house designed for 333 cars, power house and other buildings, estimated to cost $1,500,000, including machinery. A one-story automobile service, repair and garage building will also be erected for trackless trolley cars.

Herman L. Winterer, 942 North Front Street, Philadelphia, machinery dealer, has inquiries out for two Corliss engines, each 28 x 48 in., with accessory equipment.

The Philadelphia Auto Radiator Co., 263 North Fifteenth Street, Philadelphia, has awarded a general contract to Lewis Swerdloff, 228 South Fifty-ninth Street, for a two story service and repair works, 65 x 215 ft., estimated to cost $75,000 with equipment. F. N. Greisler, 1035 Walnut Street, is architect. William and Robert Lipkin head the company.

The Ridgeway Refrigerating Co., Fifth and Tioga Streets, Philadelphia, operated by F. H. and J. D. Baker, will begin the erection of a two-story and basement addition, 47 x 72 ft., to cost $42,000, for which a general contract has been let to the John N. Gill Construction Co., 121 North Broad Street.

The Foreign Trade Bureau, Philadelphia Commercial Museum, Thirty-fourth Street, near Spruce Street, has received an inquiry (42590) from Fundicion de Fierro de Irapuato, Apartado No. 3, Irapuato, Mexico, desiring to receive catalogs and prices of boring mills, ball and roller bearings, baling presses, bench circular saws and jointers, disk harrows, spring-tooth harrows, barbed wire and portable electric tools; also an inquiry (42594) from A. Couto & Companhia, Rua Garibaldi 96, Curityba, Parana, Brazil, desiring to get in contact with manufacturers of tinplate, iron and steel products, etc.; an inquiry (42596) from Bungo Frerès, Havre, France, requesting to be placed in touch with American manufacturers of hydraulic apparatus for testing pressure gages; an inquiry (42602) from Santiago Massolo, Lavalleja 305 Esq. Vera, Buenos Aires, Argentina, desiring to get in contact with American manufacturers of machinery for the production of toothpicks, and an inquiry (42592) from Wah Heng & Co., 163 Dalhousie Street, Rangoon, India, with plans for the establishment of a paper and cardboard manufacturing plant at Canton, China, and desiring to get in contact with American manufacturers of machinery for this purpose.

The Mercer Motor Car Co., Trenton, N. J., has been formed under State laws with capital of $500,000, and 5000 shares of common stock, no par value, to take over the former local plant and business of the Mercer Motors Co., bankrupt. The new company purposes to improve the plant and begin operations at an early date for the manufacture of four and six-cylinder automobiles, giving employment, it is said, to upward of 500 men. The organization is headed by John L. Kuser, one of the original owners of the Mercer plant, and William E. T. McDevitt, Philadelphia, who recently purchased the property under bankruptcy proceedings.

The Scranton Electric Co., Scranton, Pa., has plans under way for a new steam-operated electric generating plant at Ransom, to cost $500,000 with equipment. A transmission line will be built.

The Lehigh Valley Coal Co., Mahanoy City, Pa., has plans for the remodeling and modernizing of the coal breaker at its Centralia mine, to include the installation of new hoisting, conveying and other machinery.

The Grupp Foundry Co., Quakertown, Pa., is said to be planning the erection of a one-story addition.

The Philadelphia & Reading Railway Co., Philadelphia, is said to be planning the construction of a one-story machine shop and sheet metal works at its proposed grain elevator in the Port Richmond district, to be operated in the name of its subsidiary, the Philadelphia Grain Elevator Co. Power plant equipment will be installed, with mechanical unloaders, drying apparatus, etc. The entire plant will cost more than $750,000.

The York Water Co., York, Pa., has authorized plans for extensions and betterments in its waterworks, to include the installation of additional pumping machinery, boilers, filters and accessory apparatus.

The Haddock Mining Co., Pottsville, Pa., operating at the Silver Brook coal mines in this section, has acquired additional anthracite coal properties at Salem Hill, near Pottsville, and plans for early operation and the installation of equipment. John C. Haddock is president.

The Lehigh Valley Railroad, Philadelphia, has plans under way for extensions to its car repair shops at Packerton, near Lehighton, Pa., for which considerable equipment will be required. H. J. McQuade is purchasing agent.

The Edison Electric Light & Power Co., York, Pa., has acquired the Railroad Electric Light & Power Co., operating in York County, and plans for extensions and improvements.

Chicago

CHICAGO, Sept. 8.

THE Chicago Board of Education has finally placed orders for 58 engine lathes for the Crane Technical High School, involving an expenditure of about $55,000. It still has 11 lathes to buy for the Senn High School and four for the Schurz High School, besides considerable miscellaneous equipment. An inquiry is expected shortly for 24 engine lathes for the Tilden High School. The lathe purchase was the principal transaction of the week, although orders for individual machines are more plentiful and inquiries more numerous. A Milwaukee company is in the market for 16 miscellaneous tools, including both vertical and horizontal turret lathes, involving a total outlay of $45,000 to $50,000.

Crane awards the past week included the city of Elmhurst, Ill., one 3-ton 31-ft. span double-girder hand-power crane, and the Great Lakes Forge Co., Chicago, one 1-ton hand-power underhung traveling crane, both to H. D. Conkey & Co.

The P. B. Yates Machine Co., Beloit, Wis., has placed an order for a 60 x 84-in. x 12-ft. planer, with four heads on the cross rail and with a Reliance reversing motor. The equipment of the Lafayette Motor Co. plant at Milwaukee is now being moved to the Ajax Motor Co. works at Racine, formerly the Mitchell plant. It is expected that within the next few months approximately $1,000,000 worth of special purpose and standard machine-tool equipment will be bought for the Ajax plant.

The Pollard Brothers Mfg. Co., 4034-36 North Tripp Avenue, Chicago, recently incorporated with $25,000 capital stock, is a reorganization of a partnership which had been operated under the name of Pollard Brothers. The new company will continue to manufacture angle steel welded bench legs, welded factory steel stools, machine shop work benches, bar stock racks and light structural steel work. It has also added a line of park benches and a radio division in which it manufactures loops, and complete four and five reflex sets, neutrodyne and crystal sets. The company has taken over the entire building at the address given, but is not in the market for additional equipment at present. Officers are Henry Pollard, president; J. L. Pollard, vice-president; A. R. Pollard, secretary and treasurer.

The Nye Tool & Machine Works, 108 North Jefferson Street, Chicago, has taken bids through Mundle & Jensen on a one-story mill construction factory, 100 x 300 ft., at Fullerton and North Keeler Avenues, to cost $130,000.

The Whiting Corporation, Harvey, Ill., has awarded a contract for a one-story power plant, 75 x 75 ft., to cost $50,000.

The Mississippi Valley Structural Steel Co., St. Louis, will build a structural steel storage warehouse, 80 x 500 ft., at its Decatur, Ill., plant.

The Cedar Falls Mfg. Co., Cedar Falls, Iowa, has started operation in a building owned by Walter Voorhees, at the east end of Third Street. The plant has been remodeled to manufacture bumpers for light automobiles. Those active in the new company include B. P. Hansen and H. S. Ashland.

both of Cedar Falls, and J. H. Gunderson and Theodore Gullard of Frost, Minn.

Robert J. Rote has purchased the machine shop of G. H. Hagius, 1221 Second Avenue, Rock Island, Ill. The new owner will continue the business and has added facilities to permit handling a general line of contract, jobbing, repair, tool, die and machine shop work. The plant is also equipped to handle pressing and stamping work.

The Stephens-Adamson Mfg. Co., manufacturer of conveying, transmission and screening machinery, Aurora, Ill., is erecting an addition to its main plant. This will complete the third section to its steel fabricating department which will total 220 x 300 ft.

The Artesian Ice Co., Fort Madison, Iowa, will begin the erection of a one-story addition to cost approximately $75,000, including equipment.

Fire, Aug. 25, destroyed a portion of the plant of the Kratzer Carriage Co., 100 South West First Street, Des Moines, Iowa, manufacturer of motor truck bodies, etc., with loss estimated at $100,000, including equipment. It is planned to rebuild.

The Crane Co., 836 South Michigan Avenue, Chicago, will soon take bids on a general contract for its proposed factory branch and shop at Evansville, Ind., to be two stories and basement, 115 x 125 ft. A traveling crane will be installed. Shopbell, Fowler & Thole, Furniture Building, Evansville, are architects.

The A. C. Dunham Co., Marshalltown, Iowa, manufacturer of heating equipment, pumping apparatus, etc., has acquired the plant and property of the Young Pump Co., Michigan City, Ind., specializing in the manufacture of electric-operated vacuum pumps and parts. The sale includes the patent rights of manufacture and the new owner will continue the Michigan City works as a branch plant for the same line of production.

Bids are being asked by the City Council, Owatonna, Minn., until Sept. 16 for work and equipment for its proposed one-story municipal electric light and power plant, 65 x 86 ft., estimated to cost $350,000. Arthur Mullergren, Gates Building, Kansas City, Mo., is engineer.

Buffalo

BUFFALO, Sept. 8.

INQUIRIES for machine tools are appearing in a little better volume, although mostly for individual tools. The Salisbury Axle Co., Jamestown, N. Y., has completed its recent purchasing, the major part of the buying being second-hand tools. It is understood that this company recently obtained a large contract from an automobile company.

The United States Government will again offer for sale, the Erie, Pa., howitzer plant, better known as the Erie brake shoe plant. It was offered for sale a year ago, but it is understood the original contract was never carried out by the purchasers.

William F. Schwartz, commissioner of public works, Municipal Building, Buffalo, is taking bids until Sept. 23 for building and equipment for a garbage disposal plant, with alternate estimates asked for an incinerator plant with capacity of 400 tons per day, estimated to cost $500,000 with machinery, and a reduction plant of 240 tons daily capacity, estimated at $650,000 with equipment. A site has been purchased at Bailey Avenue and Dingens Street for the works.

The Gallagher Motor Co., 81 Monroe Avenue, Rochester, N. Y., has awarded a general contract to F. H. Rapp, 456 Plymouth Avenue, for a two-story service, repair and garage building, 36 x 130 ft., at Monroe Avenue and Chestnut Street. C. Ade, 104 East Avenue, is architect.

Following the recent purchase of the municipal electric power plant at Newark Valley, Tioga County, N. Y., the Binghamton Light, Heat & Power Co., Binghamton, N. Y., has made application for extensions and improvements, including the construction of four new high-power transmission lines, with substation apparatus, etc.

The Standard Oil Co., 26 Broadway, New York, has preliminary work in progress on its new oil storage and distributing plant on Grand Island, near Buffalo, to cost $500,000 with equipment. Later it is said that an oil refinery will be constructed on a neighboring tract.

The New York Central Electric Corporation, Dundee, N. Y., is reported to have preliminary plans under way for a hydroelectric generating plant near the outlet of Keuka Lake, with initial capacity of 3000 hp. to include the construction of a power transmission line from the present generating station at Penn Yan to a point near Corning, N. Y.

Swanson's Machine Shop, 409 Washington Street, Jamestown, N. Y., has awarded a general contract for a one-story machine shop to cost $25,000, including equipment. Leonard F. Swanson is head of the concern.

The Aetna Mfg. Co., Erie, Pa., is in the market for a 20-hp. boiler with auxiliary equipment.

Punch presses, lathes, welding and other equipment will be required by the Jamestown Metal Desk Co., Blackstone Avenue, Jamestown, N. Y., manufacturer of metal office furniture and equipment, in connection with a one-story addition under construction.

Whitmer & Johnson, 367 Hamburg Street, Buffalo, N. Y., sash and door manufacturer have filed plans for a three-story addition, 67 x 67 ft., to cost $50,000, exclusive of equipment.

Contract has been awarded to the H. K. Ferguson Co., Cleveland, by John E. Roberts & Son, 1284 East Second Street, Jamestown, N. Y., for a one-story machine shop to cost $20,000.

New England

BOSTON, Sept. 8.

MACHINE tool requirements of the Boston & Albany, New York, New Haven & Hartford and Bangor & Aroostook railroads, the Fore River works, Bethlehem Shipbuilding Corporation, Ltd., and other New England industries have not gone beyond the inquiry stage. Bookings, particularly those by local new and used machinery dealers, for the past week once more involved only a small investment. A hopeful feeling prevails in the trade, however, for it is believed business will develop before the close of September. Prices are reported steady and unchanged all along the line.

Bids close Sept. 18 for a proposed West Medford, Mass., junior high school, two stories and basement, to cost approximately $375,000 without mechanical equipment. Manual training departments will be installed. M. A. Dyer, 1 Beacon Street, Boston, is the architect.

Fire last week destroyed the plant of the New Westerly Granite Co., Milford, N. H., with a loss of $65,000. The company plans to replace equipment, including lifting appliances, at an early date.

The Charles H. Tenney Co., 200 Devonshire Street, Boston, engineer, is taking bids for a one-story, 64 x 66 ft., electrical substation to be built by the Malden Electric Co., Malden, Mass., for which conveying equipment is required.

Johnson & Bassett, Inc., Worcester, Mass., wool-spinning machinery, has awarded contract for a six-story, 30 x 90 ft., addition. Metal-working equipment will be required. The company also will spend $30,000 on other plant improvements.

The town of Methuen, Mass., is erecting a $250,000 school addition to contain vocational training and other departments. Ashbon, Huntress & Alter, 477 Essex Street, Lawrence, Mass., architects, are in charge of the project.

The South & Winchester Mfg. Co., South Windham, Conn., has started the erection of a one-story, 48 x 90 ft., foundry to cost, without equipment, approximately $25,000. Plans are private. The company requires lifting and conveying equipment.

The Boston & Maine Railroad, Boston, will enlarge its Springfield, Mass., engine house to provide better accommodations and facilities for repairing engines of the Connecticut River division, the work to cost about $50,000. Additional shop equipment is necessary.

The Lynn Gas & Electric Co., Lynn, Mass., has applied for permits to construct a supplementary electric plant to cost $1,000,000, for which a crane is under consideration, and 11 coke ovens, a coal storage unit and a supplementary coke quenching station. The ovens, coal storage and quenching station will cost in the neighborhood of $600,000.

The Simonds Saw & Steel Co., Fitchburg, Mass., has acquired a three-story plant containing about 62,000 sq. ft. of floor space at Columbia Road, Covington and East Eighth Streets, South Boston, for manufacturing purposes. It will be remodeled and possibly enlarged, but the company has no intentions of employing more than 100 operatives at present. A manufacturing plant is also being erected at Fitchburg.

Francis T. Hammond, 490 Pleasant Street, New Bedford, Mass., architect, has plans for the construction of a two-story automobile service, repair and garage building, 125 x 140 ft., to cost $80,000.

Lombard & Co., 236 A Street, South Boston, manufacturer of grindstones, abrasive materials, etc., has awarded a gen-

eral contract to the J. S. Smith Construction Co., Newton, Mass., for a two-story plant at Somerville, Mass., 150 x 180 ft., to cost $36,000. Clifford & Roeblad, 101 Tremont Street, Boston, are architects.

The Berwick Business Corporation, North Berwick, Me., will begin the construction of a one-story box-manufacturing plant, 60 x 280 ft., to cost approximately $65,000 with equipment. J. E. Richardson, 56 Grove Street, Dover, N. H., is architect.

St. Louis

ST. LOUIS, Sept. 8.

PLANS are being arranged by the Oilton Iron & Metal Co., Oilton, Okla., recently organized, for the construction of a one-story machine shop estimated to cost $20,000. Philip Gordon heads the company.

The Imse-Schilling Sash & Door Co., Beck Avenue, St. Louis, has construction under way on a new two-story and basement plant, 100 x 225 ft., with three-story portion adjoining, estimated to cost $300,000 including equipment, for which a general contract recently was let to William H. Cunliff, St. Louis. Walter F. Manske, St. Louis, is architect.

The Board of Education, Kansas City, Mo., will install a manual training department in the new three-story and basement high school, 150 x 365 ft., now in course of construction, for which a general contract recently was let to Collins Brothers, 1600 Grand Avenue, estimated to cost $700,000. Charles A. Smith is architect and N. D. Downes mechanical engineer, both with headquarters in the Finance Building.

The Oklahoma Gas & Electric Co., Oklahoma City, Okla., plans extensions and improvements in its steam-operated electric power plant at Clinton, Okla., including the installation of additional equipment. E. E. Hunter, 626 West Eleventh Street, Oklahoma City, is engineer.

The Chicago, Rock Island & Pacific Railroad Co., Chicago, is said to be arranging a list of equipment for the new machine shop being erected at its repair works at Shawnee, Okla., to cost $70,000.

The Inland Utilities Co., Hobart, Okla., has construction in progress on a new steam-operated electric power house. Plans are under consideration for building a transmission line to Rocky, Okla., about 8 miles distant.

Detroit

DETROIT, Sept. 8.

PLANS have been completed by the Flint Structural Steel Co., Flint, Mich., for a one-story addition, 80 x 100 ft. R. W. Heerlien is vice-president.

The Mobler-Westphal Co., 309 Michigan Avenue, Ypsilanti, Mich., has inquiries out for a hammer type riveting machine, to handle ⅝-in. diameter rivets.

The Freeman Automobile Truck Co., Algonac, Mich., recently organized, is completing plans for the establishment of a plant to cost approximately $40,000. Additional units will be built later.

The Grand Rapids Railway Co., Grand Rapids, Mich., will rebuild the portion of its car barns and shops recently destroyed by fire with loss estimated at $75,000. Williamson, Crow & Proctor, Gilbert Building, are architects.

The Hudson Motor Car Co., East Jefferson Avenue, Detroit, has plans for a one-story power house, 46 x 50 ft.

Plans have been consummated for a reorganization of the Roamer Motor Car Co., Kalamazoo, Mich., manufacturer of automobiles, and the transfer of the assets of the company to a new Canadian organization of the same name. The local plant will be continued in operation and a Canadian works will be established at or near Toronto, for parts production and assembling.

The Common Council, Bellaire, Mich., is having estimates of cost made for rebuilding the municipal electric light and power plant, destroyed by storm several weeks ago, with loss estimated at $40,000.

The Flint Motor Co., Flint, Mich., will establish a new factory branch at 532 North Capitol Avenue, Indianapolis, with parts, service and repair departments. H. L. Archy has been appointed manager.

The Hoover Suction Sweeper Co., North Canton, Ohio, has acquired the machinery, tools and other assets, excluding real estate, of the Utility Electric Refrigerator Co., Adrian, Mich., for which George H. Lehman recently was appointed permanent receiver. The acquisition includes the patent rights of manufacture, and the purchasing company is said to be planning to expand its production to include electric refrigerators.

Pittsburgh

PITTSBURGH, Sept. 8.

SINGLE tool orders appear to be more numerous, but in a broad sense trading still is quiet. A Pittsburgh district plant, formerly engaged in the manufacture of automobile engines, is being abandoned and the equipment sold. In the past week or so these tools have provided considerable competition with new tools because of prices. Wood-working machinery is doing well. The Carnegie Steel Co. is expected to close soon on the tools for its new machine shop at the Homestead works, but there does not seem to be the same promise about other important lists which have been before the trade for some time. The National Tube Co. bought a few tools for the Gary tube plant boiler shop but is not moving with much speed toward closing against the metal-working tools.

Crane inquiry is somewhat livelier, but awards are few and most of the new inquiries are chiefly for prices for estimating purposes. The Buckeye Coal Co., Nemacolin, Pa., coal-mining subsidiary Youngstown Sheet & Tube Co., purchased one 10-ton, 57-ft. 9½-in. span machine shop crane from the Morgan Engineering Co.

Work will soon begin on a one-story addition to the plant of the Vanadium Alloys Steel Co., Latrobe, Pa., 71 x 260 ft., primarily for a hammer shop. A portion of the structure will be used for power house service.

The Pinkerton Motor Co., 1309 Irvin Avenue, Pittsburgh, has plans for a two-story and basement service, repair and garage building, 70 x 87 ft., estimated to cost $35,000. H. L. Greer is secretary.

The Scohy Sheet Glass Co., Sisterville, W. Va., recently organized to take over and consolidate a number of local plants, will begin remodeling its main works to convert the plant from hand-made to machine-operated. A contract for glass machines has been let to the Russell Engineering Co., St. Louis, and awards for miscellaneous other equipment will soon be made.

The Connolly Motor Co., 810 Fourth Avenue, Huntington, W. Va., will begin the erection of a three-story service, repair and garage building, 47 x 200 ft., at 615 Fourth Avenue, to cost about $60,000. J. R. Gieskie, 1684 Sixth Avenue, is architect.

The Pennsylvania Plate Glass Corporation, Durant City, Pa., recently organized, will begin excavations for the initial units of its proposed local plant, consisting of several one-story buildings, with power house and machine shop. It is estimated to cost close to $500,000 with machinery.

The National Malleable Castings Co., 7706 Platt Street, S. E., Cleveland, will begin the construction of a one-story machine shop, 100 x 190 ft., at its Sharon works, estimated to cost $175,000 with equipment.

The Mitchell Spring Co., Johnstown, Pa., has awarded a general contract to the Thiele Construction Co., 823 Pine Street, for a one-story factory estimated to cost $25,000. Harvey Mitchell is vice-president. Gray & Chaflin, Colonial Building, are engineers.

Indiana

INDIANAPOLIS, Sept. 8.

A GROUP of stockholders and creditors of the Anderson Foundry & Machine Co., Anderson, Ind., has secured permission from the circuit court to take over the plant on Sept. 12. A new corporation will be formed to operate the works, issuing capital stock for $1,400,000, to handle certain claims and provide working capital.

The Hoess Brothers Co., Hammond, Ind., manufacturer of mechanical equipment, has awarded a general contract to J. K. Doppler, 3925 Ivy Street, for a one-story machine shop on East Summer Street. The company has property at this location and will erect other plant units in the spring.

The Board of Education, Elkhart, Ind., is completing plans for a one-story power house at the Central High School, estimated to cost $75,000.

Manual training equipment will be installed in the two-story high school to be erected at Michigan City, Ind., estimated to cost $225,000, for which bids are being received on a general contract until Sept. 25. Freyermuth & Maurer, South Bend, Ind., are architects.

The Standard Oil Co. of Indiana, Indianapolis, has plans for enlargements in its gasoline refining plant at Glen-

rock, Wyo., to double the present capacity and to cost $350,000 including equipment.

The Interstate Power Co., Indianapolis, is considering the construction of a steam-operated electric generating plant near Jeffersonville, Ind., on the Ohio River, now owned by the Interstate Public Service Realty Co., a subsidiary. It has secured permission to issue preferred stock for $200,000, and common stock for $235,000, the proceeds to be used for extensions, including the construction of a transmission line to Scottsburg, Ind.

The American Strawboard Co., Noblesville, Ind., has work under way on an expansion program to cost approximately $200,000, including equipment.

The Indianapolis Body Repair Co., Indianapolis, manufacturer of automobile bodies and operating a general body repair works, will build a new plant at 1749 North Senate Avenue. The present works will be removed to the new location.

The Board of School Trustees, Greenfield, Ind., plans the installation of manual training equipment in its proposed new two-story high school, estimated to cost $100,000, for which plans are being drawn by O. P. Gordon, 418 Mechanic Street, architect.

Cincinnati

CINCINNATI, Sept. 8.

A SLIGHTLY better tone is noted in the machine-tool market. Manufacturers are encouraged as to the outlook, and express confidence that bookings will gradually increase. The volume of business done during August was considerably ahead of that in July, and the first week of September has witnessed an improvement over August. Railroad purchases have been fairly numerous the past two weeks, and two Eastern roads have small lists out. The Seaboard Air Line and the Chicago & Great Western are inquiring for small machines. It is not expected that much railroad buying will be done in the next few weeks.

Orders from the automotive industry have been disappointing, but manufacturers expect an increase from this source within the next month. The general industrial field is not productive of much profitable business at the moment. In fact, no large orders have been placed in the local market.

The Norfolk & Western Railroad bought a boring machine and several small tools the past week. A local plant sold a 72-in. planer to the United States Cast Iron Pipe & Foundry Co., while 24-in. and 36-in. planers were purchased by several Pittsburgh companies. The P. B. Yates Co., Beloit, Wis., bought an 84-in. planer. Several fair-sized sales of used machinery have been made in the past week. Practically all of the business placed, however, has been small orders. Electrical tool manufacturers are operating on a slightly heavier schedule, but production is still somewhat curtailed.

The Louisville Petroleum & Refining Co., Louisville, Ky., will begin the erection of a $150,000 refinery in that city on the Western Parkway, near the site of the new Ford plant.

The Oesterle Wagon Works, Marietta, Ohio, recently destroyed by fire, will not be rebuilt, according to owners of the property. The employees are reported to be considering the formation of a cooperative company and the opening of a new shop.

W. P. Anderson, Cincinnati, has awarded a general contract to the Ferro Concrete Construction Co., Third and Elm Streets, for a four-story and basement automobile service, repair and garage building, 100 x 180 ft., estimated to cost $500,000 with equipment.

C. W. Kinnison, Willoughby, Ohio, has awarded a general contract to the Austin Co., Cleveland, for a one-story automobile service, repair and garage building, 100 x 155 ft., at 634-42 East Grey Street, Louisville, estimated to cost $60,000.

The Common Council, Jackson, Ky., plans the installation of electric-operated pumping equipment at the proposed municipal waterworks, for which A. B. Hargis, Jellico, Tenn., architect and engineer, is preparing plans.

E. W. Cooper, 174 Third Avenue, North, Nashville, Tenn., engineer, has inquiries out for a lathe, suitable for turning stone columns, diameter up to about 4 ft.

The R. L. Brown Coal Co., Evarts, Ky., recently organized, has acquired about 500 acres in this section, heretofore held by the Standard Harlan Coal Co., and plans for early development of a portion of the tract. Equipment, including electric power apparatus, hoisting and conveying machinery, etc., will be installed. R. L. Brown is president.

Pacific Coast

SAN FRANCISCO, Sept. 3.

HUBBARD & CO., Sheldon Building, San Francisco, manufacturers of electric line equipment and other electrical apparatus, with main works at Pittsburgh, have awarded a general contract to the Austin Co. for a new plant at Emeryville, Cal., estimated to cost $500,000 with machinery.

The Southern California Edison Co., Los Angeles, has been granted 18 water permits by the State Divison of Water Rights, covering for the most part sites on the San Joaquin River. The company plans the construction of a group hydroelectric power project, including 17 generating stations with combined capacity of 1,450,000 hp., with power dams, storage reservoirs and steel tower transmission lines. The work will be carried out over a period of years.

The Nevada-California Power Co., Riverside, Cal., has secured permission to use water from the North Fork of Rush Creek for a proposed hydroelectric generating plant to cost $160,000.

The Coast Rock & Gravel Co., Fresno, Cal., contemplates the installation of a new rock-crushing plant at Roche, Tulare County, estimated to cost $200,000 with machinery. A. R. Kerstetter is manager.

The Red River Lumber Co., Westwood, Lassen County, Cal., will construct a one-story veneer mill, 160 x 200 ft., to cost $90,000.

The Atchison, Topeka & Santa Fe Railway Co., Kerckhoff Building, Los Angeles, has awarded a general contract to the Sumner Sollitt Co., Delta Building, for a three-story ice-manufacturing and icing plant, 125 x 330 ft., at Winslow, Ariz., to cost $200,000 with equipment.

The Prince Consolidated Mining Co., Pioche, Nev., and other mining interests in this section, have plans for the construction of a central steam-operated electric generating station. It will probably be located at the Prince properties.

The Union Ice Co., Oxnard, Cal., will proceed with the construction of a new one-story ice-manufacturing plant, estimated to cost $60,000 with equipment.

Milwaukee

MILWAUKEE, Sept. 8.

BUSINESS in machine tools is going forward slowly, but probably with less hesitancy than in June or succeeding months. Bare necessities dictate every purchase. The automotive industries are the best buyers, but their needs are relatively small and of a miscellaneous character. Opening of the tool room of the new Ajax Motors Co. plant in Racine, Wis., a Nash interest, portends early purchase of equipment, although it is now known that plans are to transfer the machinery of the LaFayette Motors Corporation from Milwaukee to Racine, the LaFayette organization having been discontinued.

The Wisconsin Public Service Corporation, 559 Marshall Street, Milwaukee, is at work on plans for an addition to the steam generating plant at Oshkosh, Wis., to be built early next spring, which will require an additional 5000-hp. turbo-generator set. E. W. Rider is manager at Oshkosh. Clement C. Smith, Milwaukee, is president.

Frank C. Schultz, 2002 Fond du Lac Avenue, Milwaukee, let contracts Sept. 3 for the erection of a storage and service garage, 51 x 116 ft., part two stories and basement, at Teutonia Avenue and Wright Street. Bids will be asked soon on shop equipment, gasoline pumps, compressors, etc.

The city of Madison, E. E. Parker, city engineer, is asking figures on the installation of a 50,000-gal. steel water tank mounted on a 75-ft. steel tower. H. C. Buser is city clerk.

C. M. Osborn, city manager, Kenosha, Wis., will close bids Sept. 15 for the construction of a municipal garage and repair shop, 60 x 165 ft., part two stories and basement, estimated to cost $35,000 equipped. J. M. Albers, city building inspector, is architect.

The Kewaskum, Wis., Board of Education will receive bids until Sept. 22 for the erection of a high school, with vocational training facilities, designed by Robert A. Messmer & Brother, architects, 221 Grand Avenue, Milwaukee. The estimated cost is $225,000. Dr. E. L. Morgenroth is president.

Joseph J. Leinfelder, 305 South Third Street, La Crosse, Wis., manufacturer of sheet metal specialties and products, has incorporated the business as the Joseph J. Leinfelder & Sons Co., capital stock $30,000. Cyril and Florian Leinfelder are also named as incorporators and there is no change in ownership or management. Additions to the factory are contemplated to provide capacity for manufacturing sheet metal buildings, portable houses and garages, etc.

The Northern Wisconsin Produce Co., Manitowoc, Wis., let the general contract to the Schuette Construction Co., 826 South Eighth Street, local, for a new cold storage warehouse and refrigerating plant, 150 x 160 ft., two and three stories and basement, estimated to cost $200,000. Equipment has not yet been purchased, but bids will be taken shortly by B. K. Gibson Co., consulting engineer, 624 South Michigan Avenue, Chicago. Stanley Eckels is general manager of the Manitowoc company.

The Spence & Barrett Auto Sales Co., South Milwaukee, Wis., let the contract to D. B. Danielson, 874 Layton Boulevard, Milwaukee, for a $50,000 public garage, sales and service building, 60 x 114 ft., two stories and basement. The architects are Davis & Tuckewell, 332 Grove Street, Milwaukee.

Gulf States

BIRMINGHAM, Sept. 8.

FOLLOWING the loss of its machine shop by fire, Aug. 26, the Hardie-Tynes Mfg. Co., Birmingham, manufacturer of engines, parts, etc., has authorized the immediate rebuilding, with cost estimated at approximately the amount of the fire loss, $700,000, including equipment. Pending the completion of the structure the company has leased two machine shops near its works. The foundry, pattern shop and forge shop were not affected by the fire. W. D. Tynes is president.

Bids will be received by the United States Engineer, Florence, Ala., until Sept. 12 for one 10-ton electric traveling crane for installation at the power house at the Wilson Dam, Tennessee River.

Fire, Aug. 27, destroyed a portion of the plant of the Texas Barrel Co., West and Nancy Streets, Houston, Tex., with loss estimated at $40,000 including equipment. It is planned to rebuild.

The Farmers' Cotton Oil Co., Texarkana, Tex., recently formed with a capital of $100,000, has preliminary plans for a new cottonseed oil mill to cost $45,000 with equipment. D. C. Harrington and W. T. Murphy, both of Texarkana, head the company.

The Common Council, Paducah, Tex., plans the installation of centrifugal pumping equipment in connection with a proposed waterworks plant and system, estimated to cost $100,000. The Gantt-Baker Co., Inc., First National Bank Building, Oklahoma City, Okla., is engineer.

The Forest Lumber Co., Oakdale, La., has tentative plans for the rebuilding of the portion of its sawmill, recently destroyed by fire with loss estimated at close to $300,000 including equipment.

The M-System Mfg. Co., Fort Worth, Tex., recently organized, has leased a local building and will remodel for the manufacture of store fixtures. Woodworking and other equipment will be installed. E. H. Carlton, Fort Worth, is president.

Calvin Jones, 3053 Highland Avenue, Birmingham, has preliminary plans for a one-story automobile service, repair and garage building, to cost approximately $40,000.

The El Paso Electric Railway Co., El Paso, Tex., will expend close to $1,000,000 for the erection of an addition to its steam-operated electric power plant and the installation of equipment. A new generator and accessory apparatus will be installed.

The Magnolia Petroleum Co., Dallas, Tex., will construct a booster pumping station near Waskom, Harrison County, in connection with a new pipe line in this section, to cost $350,000 including equipment.

The City Council, Sarasota, Fla., plans the installation of centrifugal pumping equipment for the municipal waterworks. Site for a pumping plant is being acquired.

The Lyons Fertilizer Co., Tampa, Fla., will remodel its plant and install additional equipment. The company recently filed articles of incorporation with a capital of $250,000. Charles W. Lyons is president.

The Reed Roller Bit Co., 3602 Harrisburg Boulevard, Houston, Tex., manufacturer of steel bits and mechanical equipment, has plans for a one-story addition to its foundry and machine shop, estimated to cost $90,000 including equipment.

The Agee Screen Co., Summit Ave., Fort Worth, Tex., is in the market for cutting, grinding and polishing machines, as well as some woodworking equipment, for a new plant, 50 x 200 ft., now under construction. Howard Agee is president.

The Board of Education, Lamesa, Tex., is considering the installation of manual training equipment in its new high school, estimated to cost $130,000.

The Texas Power & Light Co., Interurban Building, Dallas, Tex., has secured options on a tract of more than 1,000 acres of land at Trinidad, Tex., and is reported to be planning for the erection of a new steam-operated electric generating plant on a portion of the site.

South Atlantic States

BALTIMORE, Sept. 8.

CONTRACT has been let by the General Elevator Co., 400 South Charles Street, Baltimore, manufacturer of passenger and freight elevators, to Lewis Hildebrand, 100 East Hamilton Avenue, for a one-story plant at Ridgely, Bush and Russell Streets, 65 x 160 ft., estimated to cost $80,000. W. S. Austin, Maryland Trust Building, is architect.

Bids will be received by the general purchasing officer, Panama Canal, Washington, until Sept. 24, for a quantity of bolts, rivets, spikes, washers, tacks, nails, door springs, steel tapes, magnet wire, insulated wire, fire clay, fire brick, electrical fixtures, airbrake hose and kindred products, circular 1629.

The Board of Education, Albemarle, N. C., plans the installation of a manual training department in the proposed new high school, estimated to cost $150,000, for which foundations will be laid at once. Charles C. Hook, 338 South Church Street, Charlotte, N. C., is architect.

The Common Council, Waycross, Ga., is planning for the installation of electric-operated pumping equipment and accessory apparatus at the municipal waterworks, to replace present steam-driven machinery.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until Sept. 16 for one motor-driven hand planer and jointer, with one set extra cutter head knives and two sets carbon brushes; one motor-driven bench-type saw bench, with one extra saw and two sets carbon brushes; one motor-driven band saw, with one extra set band saws and two sets carbon brushes, and one bench-type motor-driven double emery grinder, for the Mare Island Navy Yard, schedule 2615; for two superheaters for the same yard, schedule 2619; for 350 seamless boiler tubes for the same yard, schedule 2628; for a quantity of cable and wire for Eastern and Western yards, schedule 2623; electrical equipment for various yards, including fuses, sockets, carbon, sleeving, etc., schedule 2599.

The City Council, Spartanburg, S. C., is planning for the installation of electric-operated pumping equipment and auxiliary machinery at the proposed new municipal waterworks on the South Pacolet River, estimated to cost $1,350,000, for which amount it is expected to vote bonds at a special election Sept. 30.

The Central of Georgia Railway Co., Savannah, Ga., is considering plans for a new ice-manufacturing and caricing plant in the vicinity of Macon, Ga., estimated to cost $1,000,000 with machinery. Electric-operated conveying equipment will be installed.

The United States Shipping Board, Washington, will take bids until Sept. 23 for 12 Diesel engines to be used primarily for testing purposes, prior to placing contracts for a number of such engine units.

The Carolina Power & Light Co., Raleigh, N. C., has acquired the plants and property of the Smitherman Power Co., operating at Troy, N. C., and vicinity; and the Deep River Power & Light Co., Pittsboro, N. C., and vicinity. The new owner will consolidate the interests and plans for extensions for increased output. Negotiations are said to be under way for the purchase of the existing municipal power plants at Pittsboro and Ellerbe, N. C., and will build transmission line and other extensions in such districts.

The Gold Dust Corporation, 111 West Washington Street, Chicago, formerly known as the N. K. Fairbanks Co., plans the construction of a power house at its proposed plant on 12-acre tract at Canton, Baltimore, recently acquired, for the manufacture of washing powders, etc. The works will cost approximately $1,000,000 and will include a machine shop. Later a second unit will be built to cost close to a like amount.

The Board of Trustees, Meredith College, Raleigh, N. C., will build a central power house at the proposed new group of college buildings, estimated to cost $3,000,000.

An appropriation of $1,000,000 is available for immediate work, for which bids on a general contract are being asked until Sept. 23. Wilson, Berryman & Kennedy, Columbia, S. C., are architects.

The Board of Education, Lynchburg, Va., plans the installation of a manual training department in the proposed junior high school, for which an increased appropriation from $250,000 to $350,000 has been secured. It is expected to ask bids on a general contract at an early date. Heard & Chesterman, People's National Bank Building, are architects.

Plans have been filed by the Carolina Machine Co., Fayetteville, N. C., for the construction of a one-story foundry to cost $50,000 with equipment.

Canada

TORONTO, Sept. 8.

INTEREST in the machine tool market is steadily improving. Orders the past week were larger than those of the previous week and inquiries covering a variety of tools are coming from practically all districts of the Dominion. Machinery and tool displays at the local exhibition have resulted in a number of good sales, but in most cases orders for single tools predominate. While business is mostly in new tools, local dealers are also selling a number of rebuilt machines. The demand for sawmill and wood-working equipment has been active, tools for garages and automobile repair shops have been selling well. Several mining concerns in northern Ontario contemplate erecting new mills and considerable new business is looked for from this source.

A. H. Cot, Washago, Ont., is in the market for a drill press, vulcanizer, etc.

The Lakefield Brass & Metal Works, Lakefield, Ont., will purchase equipment for a new plant.

Paradis & Bernier, St. Sebastine, Que., are having plans prepared for an addition to cost $50,000.

The Parry Sound Garage Co., Gilbron Street, Parry Sound, Ont., will purchase a drill press, lathe, etc.

The Admiral Beatty Garage, Ltd., St. John, N. B., is in the market for equipment for an automobile repair plant. G. A. Cameron is purchasing agent.

The P. & H. Secord & Sons Construction Co., Brantford, Ont., has been awarded a general contract for the erection of a $200,000 sub-station on Wiltshire Avenue, Toronto, for the Toronto Hydro Commission.

E. V. Buchanan, manager Public Utilities Commission London, Ont., is contemplating the purchase of a Diesel engine to cost about $10,000.

It is reported that the Steel Co. of Canada, Ltd., head office at Hamilton, Ont., contemplates the erection of an addition to its plant on Windermere Avenue, Sawnsea, Toronto.

The A. R. Whitall Can Co., Montreal, is building an addition to its plant to cost $50,000.

D. Nicholson & Co., Decarie Street, Montreal, is erecting a garage to cost $200,000, for which equipment will be purchased.

Fire which started in the machine shop of the Cooksville Shale & Brick Co., Cooksville, Ont., caused damage to the plant estimated at $200,000. The owner will rebuild.

The Trenton, N. S., plant of the British Empire Steel Corporation resumed operations Aug. 18. This plant has been idle for nearly three weeks. Some new orders have been received, and according to J. E. McLurg, vice-president, the Trenton plant will continue in operation as long as orders are available.

Western Canada

The shipbuilding plant of J. Coughlan & Sons, Vancouver, B. C., was damaged by fire Aug. 30 with a loss of $500,000.

The Coleman Light & Water Co., Coleman, Alta., has let the general contract to William Towers, 1808 Salisbury Avenue, Calgary, for the construction of a waterworks plant to cost $28,000.

The Calgary Water Power Co., Calgary, Alta., will build an addition to its gas plant to cost $10,000.

E. L. Essley Machinery Co., Chicago, has taken over the exclusive agency in the Chicago and Milwaukee districts for the sale of the line of milling machines manufactured by the Rockford Milling Machine Co., Rockford, Ill., and the Sundstrand stub lathes and Sundstrand manufacturing lathes made by the Rockford Tool Co., Rockford, Ill.

STEEL AND INDUSTRIAL STOCKS

The range of prices in active steel and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalmers ..	59	65	Inland Steel	35½	36
Allis-Chal. pf....	100	100	Int. Har.	90½	94⅝
Am. B. S. & Fdy.	82	82	Int. Har. pf....	110¼	111
Am. Can	124½	135½	Lima Loco.	59	62¼
Am. Can pf.....	114⅝	115⅝	Nat.-Acme	5⅞	5⅞
Am. Car & Fdy.	166	169	Nat. En. & Stm.	21⅛	26½
Am. Locomotive.	79	82⅞	Nat. En. & S. pf.	75	75
Am. Loco. pf....	119¾	119¾	N. Y. Air Brake	40	42⅝
Am. Radiator ..	115¼	117⅞	Otis Steel	7⅝	8¼
Am. Steel Fdries.	36⅛	37⅝	Pressed Stl. Car.	45½	47
Bald. Loco.	118⅝	125⅞	Pressed Steel pf.	73	75
Beth. Steel	43¾	46¼	Replogle Steel...	11	12⅜
Beth. Stl. 7% pf.	92⅝	93	Republic	46½	49⅝
Br. Em. Stl. 2 pf.	9	9	Sloss-Sheffield ..	70	74½
Chic. Pneu. Tool	86½	86½	Un. Alloy Steel..	23½	23½
Colo. Fuel	33½	38⅝	U. S. Pipe.....	101	109½
Colo. Fuel pf....	108¼	108⅛	U. S. Steel.....	105⅞	110¼
Crucible Steel ..	54⅞	60¼	U. S. Steel pf...	121	121½
Crucible Stl. pf..	91	91¾	Vanadium Steel.	24⅞	27⅝
Gen. Electric ...	253⅜	275½	W'house Air Br.	92⅝	93¼
Gt. No. Ore Cert.	29	30	Y'gstown S. & T.	66¾	67⅝
Gulf States Steel	71½	76¾			

Industrial Finance

A substantial increase in net earnings from the operations of subsidiary companies of the Lake Superior Corporation, Sault Ste. Marie, Ont., excluding the Algoma Central & Hudson Bay Railway Co., is shown for the fiscal year ending June 30, 1924. The report shows net earnings at $1,156,740 against $866,582 for the previous year. The deficit brought forward from the previous year, however, more than wiped out the earnings. An encouraging feature of the statement is the showing of the Algoma Steel Corporation, the earnings of which were almost equal to the full charges, including interest, notwithstanding the fact that the mill was closed down for 123 days. Profit and loss account of the Algoma Steel Corporation, Ltd., shows net earnings from operations of $1,024,109, against $355,092 for the previous year. Interest charges for the year under review were $1,075,678. Interest on investments this year amounted to $9,614, the loss for the year, without general depreciation being $23,954. The balance at debit of profit and loss account at June 30, 1923, was $755,332, leaving a balance at debit carried forward of $779,286 for the present year.

The Ontario Steel Products, Ltd., Gananoque, Ont., in its report for the fiscal year ending June 30, 1924, shows a slight decline in profits as compared with those of the previous year, net earnings standing at $117,869 for the year under review as compared with $129,422 for the previous year. To the net profit is added the sum of $442,022, the amount brought forward from the previous year's accounts, and after dividends on common and preferred and other sundry items there is a reduced balance of $415,516 standing.

George Baker & Sons, Brockton, Mass., makers of tacks, with liabilities of $267,934 and $269,500 in assets, have filed a voluntary petition in bankruptcy. This action is a preliminary step in the reorganization of the company, which will continue operations under the management of George Baker, Herbert Baker, Edward Baker and Charles R. Felton, as heretofore. Reorganization plans, assented to by practically all creditors, call for an issue of preferred stock to creditors.

Edward W. Soleau, president American Tank & Welding Co., Belleville, N. J., has made application for the appointment of a receiver to liquidate the affairs of the company.

The recently appointed temporary receivership for the Service Tool Co., Newark, N. J., with Joseph Quigg and Watson Current acting in such capacity, has been made permanent by the local Federal Court.

The Parker Motor Truck Co., 606 Linus Street, Milwaukee, manufacturer of motor trucks, has filed a voluntary petition in bankruptcy. Liabilities of $364,756 are admitted and assets of $244,705 claimed. Assets include machinery valued at $30,000, stock on hand $100,000, notes receivable $89,371 and open accounts $20,435. The Parker company was established eight years ago, taking over the Stegeman Motor Truck Co., one of the first motor truck manufacturers in the Northwest. E. H. Neubauer is secretary.

George F. Kern, receiver of the National Drop Forging Co., Dayton, Ohio, has applied to the Common Pleas Court for permission to sell the company's assets to the City National Bank of that city for $31,996. The bank's offer is large enough to pay delinquent taxes, settle the mortgaged indebtedness and pay insurance.

Plans of New Companies

The Cement Sheet Lath Mfg. Co., 628-29 Singer Building, 149 Broadway, New York, incorporated with $100,000 capital stock, has developed a process for enveloping expanded metal sheets, with a new cementious composition, producing a thin flexible sheet structure. Principals connected with the enterprise have been engaged for many years developing metal expanding machines. It is also planned to sell these machines to manufacturers in certain territories. Negotiations are pending for the establishment of a factory which will be placed in operation soon. R. K. Johnson is secretary.

The LaMont Waste-Heat Steam Generator Corporation, 200 Fifth Avenue, New York, incorporated with 2500 shares of stock, no par value, will manufacture special heating equipment and parts. A few weeks will be required to clear away organization matters, after which definite manufacturing plans will be considered. H. V. R. Scheel heads the company.

The Niagara Electrolytic Iron Co., 40 West Fortieth Street, New York, has been incorporated with capital stock of $1,500,000, to manufacture iron products electrolytically. C. P. Perin and D. J. Ogilvie, of Perin & Marshall, New York, are incorporators.

The Stainless Steel Mfg. Co., 1 Madison Avenue, New York, has engaged in turning out a number of small steel products through mills in Massachusetts and New Jersey. More pretentious plans are being considered and will be announced later. H. L. Rupert is one of the principals.

The Standard Boiler & Steel Works, Inc., 221 Queirolo Street, Los Angeles, Cal., has been formed to operate a general boiler and tank works, specializing in heavy equipment. It occupies the shops formerly owned by the Fulton Engine Works and will manufacture dryers, kilns, rock and gravel plant equipment, packing house machinery and sugar machinery, with a 60-ft. lime kiln now under construction. It will be equipped with a 10-ft. bending roll, double-end and horizontal punches, splitting rolls, bevel shear, an 8-ft. bull riveter and a 60-ft. tower, with air and power hoists. Its main line will be Scotch marine type boilers. George J. Kuhrts, Jr., heads the company.

The Artistic Bronze Co., Bridgeport, Conn., recently incorporated to manufacture cabinet, builders' and refrigerator hardware, will continue an established business. Plant enlargements under way will double present capacity. All contracts have been let. William Winthrop Wright is president and William J. Grippin, secretary-treasurer.

The Kelly Special Body Co., 1533 Monroe Street, York, Pa., has been organized to build truck and wagon bodies. It is the outgrowth and enlargement of a body repairing business conducted for 15 years as H. P. Kelly & Son. Its equipment is regarded as complete.

John H. Graham & Co., 113 Chambers Street, New York, incorporated with $500,000 capital stock, will continue the business of the original Graham company in the manufacture of ring hardware and similar products. Mr. Graham heads the company.

Business Changes

At a recent meeting of the board of directors of the Howard Iron Works, Chicago and Granger Streets, Buffalo, Charles E. Clark was elected president and general manager and C. F. Kneiser, vice-president. Henry J. Turner, general manager for the past year and a half, has resigned as has also O. E. Frank, who was in charge of sales in the heater and expansion joint department. This department will be under the supervision of the company's chief engineer, E. A. Hahl. The same officers also head the Alberger Heater Co., an affiliated company.

The United States Cast Iron Pipe & Foundry Co. announces that the offices of its president, N. F. S. Russell, and its general sales manager, D. B. Stokes, are now located at Burlington, N. J.

McClernan & Co., 122 South Michigan Avenue, Chicago, have been appointed sales representatives in Illinois, Iowa, Wisconsin and Minnesota for the Crosby Co., maker of sheet metal stampings, Buffalo.

Maxwell Spiro & Co., iron, steel and machinery merchants, formerly of 30 Church Street, New York, have removed to Morris Canal and Grove Street, Jersey City, N. J., where ample warehouse and salesroom facilities are afforded for carrying their stocks.

Industrial Items

The Kalamazoo, Mich., branch of the C. G. Spring & Bumper Co. will be consolidated with the Illinois corporation, whose address is the C. G. Spring & Bumper Co. of Illinois, 1455 West Thirty-eighth Street, Chicago. L. W. Rickett will have charge of purchases as heretofore, and will be located at the above address on Aug. 15.

A syndicate headed by Philip E. Wright and Clifton B. Drake, Philadelphia, has purchased the business of the John B. Black Co., Chester, Pa., maker of axes and edge tools, founded in 1805. Joseph H. Hinkson was appointed receiver by the United States District Court about three months ago, since which the plant has been idle. The new owners will begin production Sept. 1.

Paul W. Miller, 94 Elm St., and Lyman B. Horton, 82 Seville Drive, Rochester, N. Y., have organized the United Mill Machinery Exchange, and will make a specialty of dealing in woodworking and metalworking machinery and equipment, heavy hardware, etc.

The Alabama Machinery & Supply Co., Montgomery, Ala., has leased property and buildings on South Foster Street, Dothan, Ala., and plans the establishment of a branch wholesale and retail heavy hardware and machinery shop about Sept. 10.

The Allis-Chalmers Mfg. Co. will install a 4000-kw. gas engine generator unit at South Works, Illinois Steel Co., making the fifth such installation in one station at that works.

The Gulf Refining Co., Pittsburgh, has ordered six 600-kw. and one 300-kw. motor generator sets and control equipment and distributing switchboard from the Allis-Chalmers Mfg. Co. for installation at its Port Arthur, Texas, refinery.

The Detroit Copper & Brass Rolling Mills, Detroit, is remodeling its power plant and increasing its capacity by the addition of a 600-hp. boiler fired by a Taylor stoker with automatic steam ash dump. This company already has in operation five 600-hp. boilers fired by Taylor stokers.

Arrangements have been made with the Pitney-Bowes Postage Meter Co., Stamford, Conn., to take over the entire manufacturing business of the Mail-O-Meter Co., Detroit. Benjamin S. Warren, president of the latter company, has retired from all business activity.

The Jones Machine Tool Co., Cincinnati, has doubled its floor space and consolidated office and salesroom with warehouses and is re-building its factory at 528 to 532 East Front Street.

The sales organization of the Warren Foundry & Pipe Co., 11 Broadway, New York, recently purchased by the Replogle Steel Co., will be under the same supervision and management as formerly. J. H. Morrison, general sales manager, has entire charge of sales with headquarters in the New York office, and M. L. Northrop will continue as New England representative, with offices at 201 Devonshire Street, Boston. Improvements at the foundries in Phillipsburg, N. J., are under consideration.

The locomotive and car shops, warehouses and other buildings, including many freight cars of the Mexican National Railways, at Aguascalientes, Mexico, considered the most important in that country, were destroyed by fire Aug. 27, with a loss of over 1,000,000 pesos.

The Joseph H. Dick Co., Canton, Ohio, manufacturer of farm implements, has been reorganized with Jesse H. Gingrich of Grand Rapids, Mich., president; Frank Dick, vice-president, and Charles F. Dick, secretary-treasurer. Mr. Gingrich succeeds the late Joseph Dick.

A petition has been filed in the United States District Court asking that a Federal receiver be appointed for the Steidle Mfg. Co., Cincinnati, manufacturer of automobile radiators. The company is in the hands of a receiver, James R. Clark, Cincinnati, named by Common Pleas Judge R. K. LeBlond, on application of the president of the company, Richmond J. Hollmeyer. The Federal receiver is demanded now to protect the assets of the company.

Net sales of the Penn Seaboard Steel Co. during the quarter ended Jan 30, totaled $732,891. A loss of $123,237 was reported, after charges, operating expenses, etc.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE, under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Bars, Shapes and Plates

	Per Lb.
Bars:	
Refined iron bars, base price	3.24c.
Swedish charcoal iron bars, base	6.75c. to 7.25c.
Soft steel bars, base price	3.24c.
Hoops, base price	4.49c.
Bands, base price	3.99c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger, base	3.34c.
Channels, angles and tees under 3 in. x ¼ in., base	3.24c.
Steel plates, ¼ in. and heavier	3.34c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.25c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	3.50c.
Toe-calk, ½ x ⅝ in. and larger	4.20c.
Cold-rolled strip, soft and quarter hard	7.00c.
Open-hearth spring steel	4.50c. to 7.00c.
Shafting and Screw Stock:	
Rounds	4.15c.
Square, flats and hex	4.65c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High-speed steel, 18 per cent tungsten	80c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.89c.
No. 12	3.94c.
No. 14	3.99c.
No. 16	4.09c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.30c. to 4.45c.	.....
Nos. 22 and 24	4.45c. to 4.60c.	5.10c.
No. 26	4.50c. to 4.65c.	5.15c.
No. 28*	4.60c. to 4.75c.	5.25c.
No. 30	4.70c. to 4.95c.	.....

Galvanized

	Per Lb.
No. 14	4.70c. to 4.85c.
No. 16	4.85c. to 5.00c.
Nos. 18 and 20	5.00c. to 5.15c.
Nos. 22 and 24	5.15c. to 5.30c.
No. 26	5.30c. to 5.45c.
No. 28*	5.60c. to 5.75c.
No. 30	6.10c. to 6.25c.

*No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
⅛ in. Butt...	—41	—24	⅛ in. Butt...	— 4	+19
¼ in. Butt...	—46	—32	¼ in. Butt...	—11	+ 9
1-3 in. Butt..	—48	—34	1-1½ in. Butt.	—14	+ 6
2½-6 in Lap.	—44	—30	2 in. Lap....	— 5	+14
7-8 in. Lap...	—41	—11	2½-6 in. Lap.	— 9	+ 9
9-12 in. Lap..	—34	— 6	7-12 in. Lap..	— 3	+16

Bolts and Screws

Machine bolts, cut thread,
50 to 60 and 10 per cent off list

Carriage bolts, cut thread,
40 to 40, 10 and 10 per cent off list

Coach screws, 50 and 10 to 65 per cent off list

Wood screws, flat head iron,
75, 20 and 10 per cent off list

Steel Wire

BASE PRICE* ON No. 9 GAGE AND COARSER	Per Lb.
Bright, basic	4.25c. to 4.50c.
Annealed soft	4.50c. to 4.75c.
Galvanized annealed	5.15c. to 5.40c.
Coppered basic	5.15c. to 5.40c.
Tinned soft Bessemer	6.25c. to 6.40c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17¼c. to 18¾c.
High brass wire	17¾c. to 18¾c.
Brass rods	15 c. to 16 c.
Brass tube, brazed	25¼c. to 26¼c.
Brass tube, seamless	21½c. to 22½c.
Copper tube, seamless	22¾c. to 23¾c.

Copper Sheets

Sheet copper, hot rolled, 20⅝c. to 21⅛c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin

Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20
IC.. $11.25	$8.85
IX.. 12.85	10.85
IXX.. 14.40	12.55
IXXX.. 15.75	13.85
IXXXX.. 17.00	15.05

Coke—14 x 20

	Prime	Seconds
80 lb..	$6.15	$5.90
90 lb..	6.30	6.05
100 lb..	6.45	6.20
IC..	6.65	6.40
IX..	7.85	7.60
IXX..	9.00	8.75
IXXX..	10.35	10.10
IXXXX..	11.35	11.10

Terne Plates

8 lb. coating, 14 x 20

100 lb	$7.00 to $8.00
IC	7.25 to 8.25
IX	8.25 to 8.75
Fire door stock	9.00 to 10.00

Tin

Straits, pig	56c.
Bar	60c. to 65c.

Copper

Lake ingot	16 c.
Electrolytic	15½c.
Casting	14½c.

Spelter and Sheet Zinc

Western Spelter	7½c.
Sheet zinc, No. 9 base, casks	10.85c. open 11.60c.

Lead and Solder*

American pig lead	9¼c. to 9¾c.
Bar lead	11c. to 12c.
Solder, ⅛ and ½ guaranteed	39 c.
No. 1 solder	36 c.
Refined solder	30½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	75c. to 90c.
Commercial grade, per lb	35c. to 50c.
Grade D, per lb	25c. to 35c.

Antimony

Asiatic	13c. to 14c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb	36c

Old Metals

The market continues active with values practically unchanged. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible	11.50
Copper, heavy wire	11.00
Copper, light bottoms	9.50
Brass, heavy	6.50
Brass, light	5.50
Heavy machine composition	8.50
No. 1 yellow brass turnings	7.25
No. 1 red brass or composition turnings	7.75
Lead, heavy	7.00
Lead, tea	5.25
Zinc	3.75
Cast aluminum	15.00
Sheet aluminum	15.25